October 1958

ARMED FORCES management

PUBLISHED FOR THE ARMY, NAVY, AIR FORCE, COAST GUARD AND MARINE CORPS

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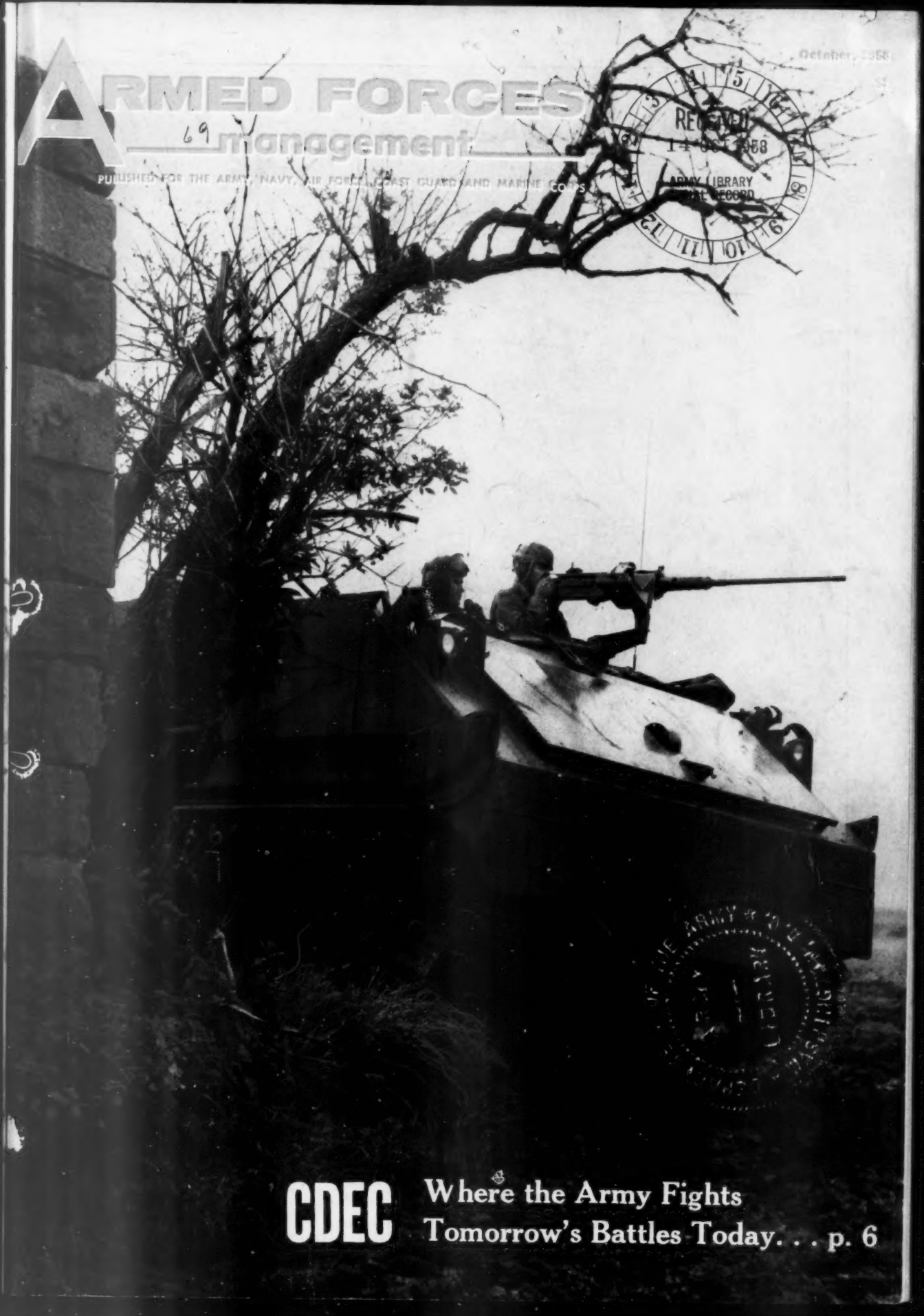

CDEC Where the Army Fights Tomorrow's Battles Today. . . p. 6

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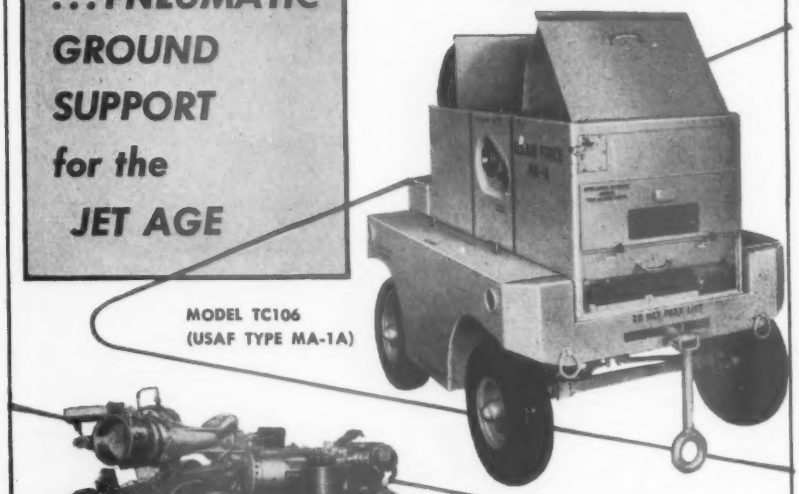

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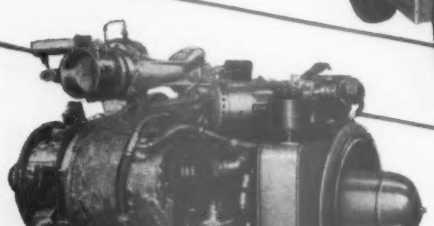

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In My Opinion

Better Management

As you know, this Headquarters monthly dispatches to all Air Force Major Air Commands world-wide a Management Reading Packet, which contains narrative articles, management periodicals, documents, brochures, and other types of reference data which are compiled for the purpose of assisting and improving management within the United States Air Force. (We plan to use) ARMED FORCES MANAGEMENT Magazine monthly, for inclusion in the Management Reading Packet.

Lt. Col. Orlo L. Austin, USAF
Chief, Management Improvement Section
D/Manpower and Organization
Department of the Air Force

Budgets

Permission is requested to reproduce your editorial entitled "Appropriation vs. Apportionment: The Misunderstood Budget" in your June 1958 issue. The reproduction will be used as hand-out material to personnel being oriented in the Army budget process.

Lt. Col. Oliver C. Culbreth
Office of the Comptroller
Department of the Army
Permission granted—Ed.

Bouquets

Congratulations . . . I thought (the August issue) was an excellent edition (and transportation is one of the few subjects I feel a little bit able to comment on . . . I wore the wheel when I was in the Army and did PIO for TC).

Alan Herbert
Hq, Air Materiel Command

NOL

Naval Ordnance Laboratory will use approximately 500 reprints of the NOL article that appeared in the August 1958 issue of your magazine.

These will be used mainly for internal distribution to Laboratory Personnel, who have shown a great deal of interest in this exposition of the NOL project manager system. In addition . . . some of these reprints will be distributed outside the Laboratory, primarily in response to inquiries on this subject.

We appreciate your interest in the Naval Ordnance Laboratory, and thank you for your courtesies . . .

Gordon W. Hirtle
Technical Information Officer
Naval Ordance Laboratory.

(Continued on page 4)

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ARMED FORCES management

PUBLISHED FOR THE ARMY, NAVY, AIR FORCE, COAST GUARD AND MARINE CORPS

OCTOBER, 1958

CDEC . . . Where Army Fights Tomorrow's Battles Today 6
A staff analysis, with introduction by Gen. Willard G. Wyman, of the post where Army is 20 years ahead of itself.

AF/Industry Relations—What Air Force Wants 13
AF Deputy Chief of Staff/Materiel Lt. Gen. C. S. Irvine gives an Air Force view on government/contractor relations—start of a series.

ADSID . . . New Single Manager for Air Defense? 14
A new tri-command, Air Force office with a huge potential will take over AF Air Defense operations

Military R&D . . . How to Make it Effective 20
Author Marvin E. Mundel offers a non-military viewpoint in suggestions for improving research results in the defense establishment.

Why AMC Wants Integrated EDPE 24
Fast, accurate supply will be the result of the Air Force Combat Logistics Net, says AMC official Winton O. Etz.

Why Flash Financial Reporting Works at Navy Aviation Supply Office 27
Comdr. A. B. Sanders makes some sound suggestions for improved financial reporting.

McElroy's First Year: The Chair Fits Well 32
The Defense Secretary's first year in office has been effective and important, say the men who work him him.

How a Navy Office Doubled Its Mail Handling Capacity 36
When it's a two-day job to get a memo across the hall it's time something was done—This is how one Navy office solved the problem.

How Air Force Quality Control Works 40
Col. C. A. Peterson, former AMC Quality Control Chief, gives a concise rundown on a money-saving system.

Why Missiles Are Everyone's Business 42
Maj. Gen. J. B. Medaris outlines a complex operation.

Streamlining Methods of Technical Writing 44
Eighth in a series by Roswell Ward.

The Place of a Management Engineer 45

Departments

In My Opinion 2
Editorial 5
Washington Background 11
Procurement and Logistics 17
Research and Development 28
Association Newsletter 31
Pentagon Profile 36
Rundown of Key Contracts 37
Personnel Preview 38
Dates To Circle 39
Your Investment Future 47
Advertisers' Index 48
Professional Services 48
New Products 49

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ARMED FORCES MANAGEMENT **Volume 5—No. 1**

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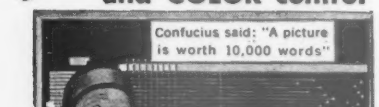

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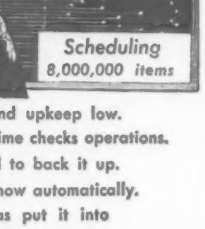

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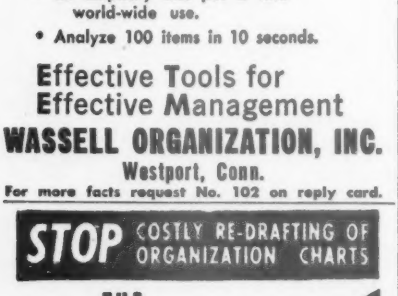

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In My Opinion cont. . . .

Technical Publications

I have been impressed with the series of articles entitled "Unified Technical Information Departments —What Are Their Advantages?" by Roswell Ward. I would like very much to get in touch with Mr. Ward.

L. W. Wallace
Ordnance Management Engineering Training Agency
Ordnance Weapons Command
Rock Island, Ill.

I am much impressed with your series on The Technical Publication Manager. They reveal a close and personal connection with the trials and tribulations of folks whose efforts are as little understood as those of any specialist anywhere. Some of the observations you make hit the bull's eye 100 percent in my experience—25 years devoted to technical writing, from freelancing to the 8-year stint at a Navy Bureau, where our total wordage now approaches nine million, not counting the millions bandied back and forth relative to our shortcomings and general inability to suit everybody.

You reveal a through experience with the management problems of writers and editors. Placed in charge of our "crash program" in 1950, I have a first-hand experience with just about everything that could go wrong, especially with the supervision of our program.

Name withheld on request

Roswell Ward can be reached by writing him at Rockledge, Bantam, Conn. —Ed.

Gobbledegook

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1. You will recall that we've been firming up this problem for some time, and just in the nature of pitching up a few mashie shots to see if we come near the green, I'd like to express these angles: First, I think we should take a reading of the situation to see if it is being spitballed correctly so that we can wham it through for approval. Since this has to be geared in before we hit the stretch, it is only logical that we throw in a few crossbucks before we take it off-tackle.

2. The best way to flirt with it, as I see it, is to give it a workover just about when we're ready to segue into it. Let's face it - when we're nosing down into the grass roots like this we're going to be lucky to get time to pushbotton it before we ride herd at an all-around group-noodling session. Let me urge that we all kick this around and put on our creative thinking caps so that all of us will profit in the final wrap-up without any cable-stitch sweaters on our teeth. I think it advisable that we all crowd in for the firm-up, at which time there will be a full spell-out.

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EDITORIAL

Nike vs. Bomarc

THROUGH a lack of understanding or a lack of appreciation or a lack of judgment or a lack of something, the Nation's press (and even some military publications) are pouring into the ears of the American public the story of another "Service bickering."

Spurred on by blasts of over-emphasized verbal hot air, the public is concluding this is another Thor-Jupiter controversy and, if carried to its ultimate, this manufactured argument will probably result in shaking the country's faith in our Defense structure once more. ("Who's guarding the country while the Services fight among themselves?")

By staring through a keyhole, observers can conclude easily that this is quite a battle. However, staring through a keyhole is not the way to discover what's going on in a room.

Is there a debate? Probably. The Services argue among themselves about a great many things: Is a foot soldier better than an F-108?; Is a missile better than a manned aircraft?; Are nuclear submarines better than both of them put together?; Should we buy more SAC bombers or more helicopters? These controversies go on all the time.

They are standard operating procedure for the Joint Chiefs of Staff. Debate, a free airing of conflicting opinions, is basic to the democratic way of life—a philosophy the Department of Defense is pledged to defend. Out of the current argument (Is Nike or Bomarc better?) could well come better decisions, an improved military posture, a greater integration of the air defense effort.

To men who understand the nature of our military organization, it would be no trick to start a new, and heated, verbal battle every week. In a $40-billion-a-year industry, a complete lack of controversy would leave grave doubts in the minds of thinking people as to the intelligence, integrity and competence of the people and systems which comprise National Defense.

Why then is there such an onus attached to any sign of opinion difference among Servicemen? Said C. P. Milne, deputy assistant secretary of defense (for supply and logistics), "In a continuously changing world situation, we can no longer set up a single fixed arrangement which will provide us with maximum security. Advanced military technology coupled with the destructive potential of Communist forces requires a different approach to our national self-preservation than we have practiced at any time in history."

Against this background, you only need ask an Army officer if he thinks the Army (or any part of it) is better than the Air Force (or the Navy); then run to the sister Service and ask the same thing—and you will have what the papers like to call an argument. Our defense structure would be in sorry shape indeed if the men who run it did not believe in the value of their own particular effort. In the Military, manifestations of Service pride used to be known as *esprit de corps*. When it gets into print, however, it apparently becomes something a good deal less admirable—if we believe the critics.

If democracy cannot be defended by a democratic organization, then the democratic philosophy evidently is not all its cracked up to be.

The Loss of a General

WHEN Lt. Gen. James M. "Slim Jim" Gavin pulled out of the Army early this year (and went to work as a vice president for Arthur D. Little, Inc.), the volatile controversy which surrounded his departure pointed up a rather startling situation—if generally true. His recently published, and hastily written, book, *War and Peace in the Space Age*, walks over approximately the same ground; is, in fact, virtually a re-hash of much of his testimony before the House Armed Services Committee in January.

The startling situation: if all members of the Pentagon's second tier of top brass face their jobs with the same feeling of confused frustration, our military management effort most certainly would falter. Fortunately for the U.S. such a generalization would not be quite accurate.

Unfortunately for the U.S., few persons made any attempt to understand the man himself, when Gen. Gavin launched his attack against the Pentagon machinery. And what *Time* magazine called "the special brand of Army 'wild blue yonder' that is the best of Jim Gavin" is buried under a preoccupation with Pentagon politics and paperwork—his reasons for the headaches in the Pentagon are not 100% correct, being in many cases the *results* of more basic legislation or policy.

Gavin's one weakness: although he could look into the future and decide what would be needed when, he had something less than an abiding interest in how it should be done. Commented one Army R&D officer: Lt. Gen. Arthur G. Trudeau, the new Army Chief of R&D, is a "perfect replacement for Gavin. Gavin left us with enough ideas to keep us busy for the next ten years, but his usual approach was something like, 'We have to get to the moon by 1960. Don't bother me with the details. Just let me know when you arrive.' Trudeau will figure out how to get there."

At least in this case, the Services failed to recognize that the scientist is a slightly different breed of cat who does not always measure progress in an administrator's terms—particularly when he is managing a scientific effort.

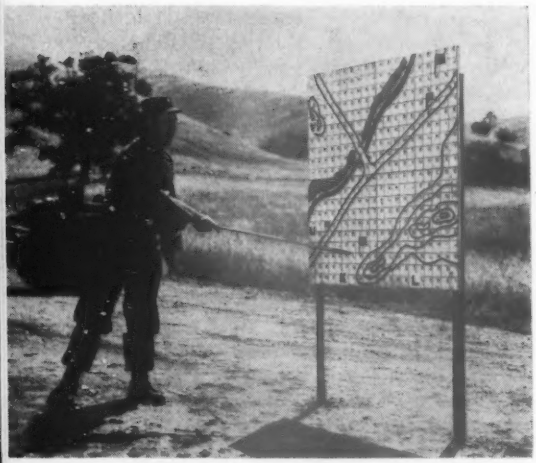
Bill Borklund

CDEC . . .

More than any other Army officer, Gen. Willard G. Wyman is responsible for the creation of the Combat Development Experimentation Center. As former commanding general of the Continental Army Command (until his mid-year retirement) Wyman not only conceived the idea but had much to do with bringing it to fruition. Here Wyman explains why CDEC can be of such far-reaching importance, and takes a look into its future . . .

by Willard G. Wyman, Gen. USA (ret.)

IT IS startling to consider that in the days of our grandfathers their travel was accomplished at a rate of speed no faster than could be attained by Alexander the Great on horseback, some 2000 years earlier. Today, after only three generations from the time of our grandparents, we find our rate of travel several times the speed of sound.



Technology in many areas has advanced as rapidly as has our rate of movement. One of the greatest responsibilities of this Nation is to insure that our advanced thinking remains ahead of the implications of new weapons which technology provides.

In the Army, advanced thinking is encouraged by a Combat Development System which is responsible for developing and testing concepts for future combat operations and organizations adapted to changing military and technical requirements. The Army's Combat Development Experimentation Center is one facet of this extensive system. Its need is apparent by the system it serves.

Elsewhere, scientists have very extensively used experimental methods and techniques for controlled observation. These techniques have been responsible for the very rapid rate of technical advances experienced in the last hundred years. Scientists dealing with problems of developing improved methods of combat operations long have realized a need for field experimentation on such problems. Careful and controlled experimentation activities associated with theoretical advances produce significant gains.

As a practical element of laboratory science, field experimentation is now an equally practical element of military technology. As applies to CDEC, adoption of recently developed experimentation techniques used to evaluate military concepts will assist in providing answers to questions posed by the Combat Developments System. Such gains can provide an efficient and valid basis for the creation of an Army of continually superior effectiveness.

This is quite a contrast to what the Army experienced in its Combat Developments System prior to the establishment of CDEC in 1956. Then, training exercises and maneuvers provided the only means of field experimentation of proposed operational and organizational concepts. This means had certain limitations: it interfered with normal training, it was an inaccurate evaluation of concepts under test, the data collected could scarcely be called objective, and continuity was lacking due to nonavailability of scientifically-trained personnel.

In its first full year of operation (1957), much of CDEC's effort was devoted to developing methodology and experimental designs that would provide factual, objective data for making valid evaluations of future concepts. CDEC has overcome the pains of childbirth and now its operation is going into high gear.

Its field experimentation produces two classes of results. The first is a valid and reliable assessment of performance under specific combat conditions where concepts are subjected to realistic examination before they are adopted or rejected. The second is the accumulation of specific performance data, permitting sound development of totally new concepts based on anticipated combat conditions.

This is particularly important when you realize that the primary field experimentation CDEC conducts involves those units which come in direct contact with the enemy on the battlefields—and, more important, those which sustain the greatest numbers of casualties. CDEC, through its military-scientific team, determines by test and experimentation the optimum organization and operations needed by the Army to win battles and reduce casualties to a minimum. During this crucial period, any time, effort or money expended towards this end is well justified.

The battlefield of the future looms as a dark cloud on the horizon of time. In the past, the Army has relied almost entirely on its combat experiences to support its concepts for the Army of the future. Now, bold scientific advances with which it has had no wartime or peacetime experience must be sponsored or grasped immedi-

ately by the military. This means that the Army must rely less and less on its wartime experiences and more and more on its Combat Developments System to pierce the dark cloud on the horizon.

This is well illustrated by the single example of the invention of gunpowder. More than 500 years elapsed between its introduction and its first use in ground warfare. Today, in contrast, some of the modern tools or weapons devised for war become obsolete even as they are being produced. We learn this, not by war, but by study and experimentation.

Such things as the rapid stockpiling of atomic weapons by both the free world and the Communist bloc will result in smaller concentrations of men and materiel on the battlefield. Theoretical studies of this particular problem can be and are improved by subsequent detailed analysis and war gaming. However, the final answer can only come from actual experience on the ground. Experimentation as conducted by CDEC will find the answer faster than the old trial and error method.

To do this tremendous job, the Army foresees an expanded role for CDEC and the Combat Developments System. During the 1958-60 period, CDEC will undertake tests of such things as organic and support firepower, organizations, operations, mobility, air transportability, command and control, communications, engineer support, resupply and medical support in conjunction with the overall experimentation program in tactics and techniques. It will help determine how many men are needed in the various organizations, types of weapons and equipment that can profitably be employed, and even assist in determining whether certain materiel should be stockpiled for mobilization requirements or declared obsolete or unsuitable and production discontinued.

As a by-product of expanded activities, many exercises and maneuvers conducted by the Army in the past for test purposes can be eliminated. Those programmed for in the future will not be burdened with a host of special test requirements placing the value of training in jeopardy.

CDEC is regarded as a focal point of common thought to be crystallized by experimentation into practical reality. All of the Army's Combat Development thinking, drawn from a broad base of experienced groups in our schools, in our senior headquarters, and in our field laboratory contribute to this approach.

Where the Army Fights Tomorrow's Battles Today

In a study of Germany's World War II planning, Capt. B. H. Liddell-Hart points out that the German Army was "more modern than any other . . . but missed its goal because it had not yet caught up with ideas that were twenty years old." To avoid a similar situation, this is what the U.S. Army is doing at its Combat Development Experimentation Center . . .

THE "missile platform" darted down a canyon, staying below the ridgeline. Pilot and missile-firer were tuned to a central fire direction center, flying blind, according to the radioed instructions. Still below the ridgeline, the platform paused, then inched a few feet farther, stopped, and waited for the fire order.

Suddenly, the turbines increased in pitch, and the "platform" shot straight up, above the crest of the ridge and fired its weapon. Just as suddenly, it dropped again out of sight and darted back up the canyon. Neither firer nor pilot had seen the target, and both were sure they had not been seen. Umpires said they scored a direct hit: the nuclear tipped missile had smashed an enemy tank column forced into concentration beyond the ridge, miles away.

An infantry squad on the battle-side of the hill collectively relaxed, knowing the tanks would not now break through the standard 1000 yd. gap between them and the next squad. (Their company was assigned a 12,000 yd. front. None of the men had slept for over 24 hours.)

The company commander, miles away, wondered how much longer even benzedrine would keep him going. He rubbed a sweat-caked sleeve across his red-rimmed eyes, and remembered how much easier battlefield tactics had been when a company operated on a 3000 yd. front—when company depth was 1500 yds. instead of 10,000 . . .

The year of this battle is now. The place is Army's Combat Development Experimentation Center spread over CDEC Hq. at Fort Ord, Calif., Camp Roberts, and Hunter Liggett Military Reservation. The "missile platform" was a helicopter, and the "missile" was a radio signal. But the men were real —as real as their lack of sleep. They

are part of a 3000-man experimental force at CDEC (called see-deck). Their goal: developing tomorrow's Army today.

The purpose of CDEC is not to train men in advanced battle tactics. It does not test new equipment, in the usual sense. It does not simply exercise units in the field. The simplest way to sum up its mission is to say that CDEC is experimenting to discover now what will be needed to win on tomorrow's battlefield, the battlefield in which tactical atomic weapons will be plentiful, and which in dispersal, mobility, communications and firepower will be the keys to victory.

CDEC personnel are top scientific and military planners, aided by an industry advisory board from the West Coast. They use scientific methods to simulate and analyze the next war's problems. (Key premise: In any situation, there are certain variables which effect a result; if these are controlled, investigating teams can tell which variable combination is best in a tactical situation.)

CDEC's location is, for the present, ideal. Although more space will be needed if CDEC is to realize its full value to all Services, the Hunter Liggett reservation (172,000 acres) and Camp Roberts (44,000 acres) are large enough for present company-size experiments. The climate is good, the area can be reached by all means of transportation, and the terrain offers considerable variety.

Although many military men have felt the need for this type of organization, it was not until Gen. Willard G. Wyman became commander of the Continental Army Command that anything was done.

Although a CDEC type set up had been suggested to CONARC earlier, the first actual activity was in Turkey, in 1952-4, when Gen. Wyman was Commander of Allied Ground Forces in that area. Wyman's operations officer at the time was a Col. Frederick W. Gibb, present CDEC commander. With Wyman's guidance, Gibb studied certain Turkish border regiments. This led to Army's Mobile Forces concept, adopted in 1954.

It was at this time that Gen. Wyman tried to sell the CDEC idea to CONARC. The Continental Army Command has the responsibility for "development and testing of organization, doctrine, tactics, techniques, weapons and material" for the Army. But it was four years after he had command of CONARC, and in the face of stiff Pentagon opposition, before Gen. Wyman put his idea to work. The CDEC installation finally received permanent status in June this year.

Besides Gen. Wyman's work, CDEC drew support from Project Vista and the Haworth Report, two Army preparedness studies. The former said we would not have time for elaborate preparations in this area after conflict began, and the Haworth Report gave active steps for implementing Vista.

The CDEC organization headed by Brig. Gen. Frederick W. Gibb, carries some 53 officers and 23 civilian scientists on its staff, with the experimental field force of about 3,000 officers and men. The ruling group at CDEC is a director staff—there are none of the normal G-1, -2, -3 and -4 sections. Directors of Field Operations, Research Plans, Programs and Training Literature, and Support Operations run CDEC. A joint review board directly under Gibb, serves as a board of directors. Field work is carried on by Project Teams from the Research and Field Operations offices. These teams vary in size according to their job, and are directed by military or civilian Project Officers.

Although actual equipment on hand at CDEC is as much as 1000% of the amount ordinarily authorized for an experimental operation, the major handicap to progress is in this area. (Until a flying missile platform is built, the CDEC people cannot run thoroughly accurate missile platform experiments.) The result, says one CDEC officer, is a "regular Rube Goldberg collection" of battle gear. Twenty-ton personnel carriers must serve, for the present, as 8-ton vehicles; jeeps are used for light armored vehicles; conventional helicopters represent flying gun platforms.

Perhaps one of the most vital functions at CDEC lies in this area, because future equipment requirements are formed in the minds of the men who plan tomorrow's battles at Hunter Liggett (where most actual experimenting is done).

Says one CDEC officer, "There is literally no limit to the kinds of equipment which the technical brains and industry of our nation can develop and produce. But the development of such material, resulting from isolated ideas and without regard to its tactical use, forces the tailoring of military operations and organizations to fit the capability of the equipment. That is a most inefficient and expensive way to maintain a progressive Army . . . if basic information concerning what is needed to conduct future military operations can be fed into the technical system, present research can be influenced in such a way as to provide a basis for future ability to produce the necessary equipment."

There are over 5000 basic pieces of equipment which CDEC uses in the various experiments, but usually only two or three thousand are used in any single experiment. In each trial run a different combination of items is used, as CDEC project teams look for the best possible combination of equipment and men.

The experiments, which run for about a year, are handled by comparing alternatives. Many alternatives for a given situation are screened in the first four-month planning period of the study. In the second four months, remaining solutions are tested in atomic battle conditions. The last four months are spent evaluating the results. Every field problem is recorded in detail at the "bubble house," CDEC's operations center. Each troop movement, casualty and message is carefully noted within minutes after it takes place in the field. The record is kept for analysis and future war-gaming.

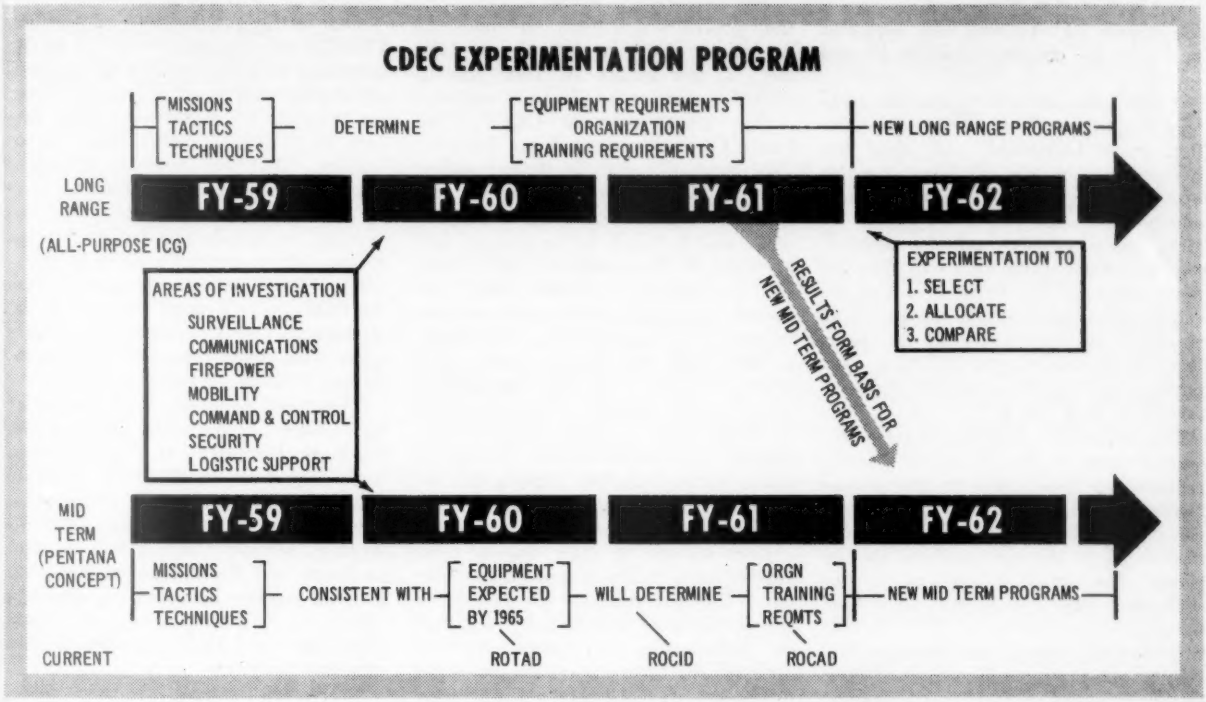
It is this data-collection system that distinguishes CDEC from other military operations. The data is used in time and motion studies, aimed at top battlefield efficiency. Although much information gleaned from the field work is handled by electronic computers, the computer results must be studied by CDEC's civilian and military staffs.

Field problem scoring is extremely difficult, and yet it is one of the best handled jobs at CDEC. The aim is for utmost realism, and short of live ammunition, the CDEC people come as close as they can. Because of this, scorers must cope with all the confusion and surprises of actual combat.

To maintain realism, umpires must keep completely out of the troop's wars. In recording tank fire, for example, it was impossible to place an umpire/observer in the tank—the quarters were simply too cramped. The tank offered CDEC scientists an extremely unstable working platform. All this, plus the short duration of tank attacks, and the complete lack of precedent in this type of work, faced the scientists with a tremendous problem.

The answer, in this case, was reached in two ways. First, blank rounds were fired to maintain realism and to alert the observer, who was stationed in the target area. Next, at Army's request, Broadview Research Corp. developed an electric light tube which, mounted on the tank's gun barrel, projected a 60,000 candle-power beam to the target, could be seen by an observer only within a five yard area of the target bullseye. A similar flashing device is used for the tank's machine guns. A refinement of this system, using infra-red indicators, is currently being developed for CDEC by Raytheon Mfg. Co.

A more general scoring aid is the



CDEC-devised grid system. Superimposed on the standard military grid, 90,000 acres at H/L are broken into 100-meter squares under a letter-color identification code. Each square in the field is marked with stakes, enabling the field commander to give an exact position report at any time. Reservation roads are similarly marked at each tenth of a mile. In the future, the CDEC communications system for control and data collection will be flexible, commercial VHF microwave, the first step to an automated location, data processing and umpiring system.

Success at CDEC hinges on careful planning. For a given project, this can begin as much as twelve months in advance of field work. By the time the experiment is set up, methods and goals are well established. To the military falls the bulk of administrative work. Objectives are established, criteria for results are proposed, and scenarios are developed. Training objectives, literature and support requirements are also handled by CDEC's Army personnel.

The chief scientist at CDEC, Dr. Ian Trevet, has no background in tanks or missiles—he is a biologist. The aim of Trevet and his staff is to apply general scientific experimental methods to simulated combat.

The scientists' job at CDEC is to polish the projects. They must analyze Army objectives, recommend changes in military planning, determine criteria compatability, develop data collection and analysis plans, and aid in forming a military evaluation plan. Also under the guidance of the scientific staff is experimental design development and setting up of objectives and umpiring procedures and probability. They must also double-check the experiment scenario and set up outside agency support.

In field work, military/scientific duties follow the same lines. The main military job is conducting preliminary experiments, shaking down plans prior to record runs. The other three military tasks are to monitor the record runs, to play-back these runs, and to revise following runs as dictated by the play-back.

At the same time the CDEC scientific staff (1) incorporates special support from outside agencies, (2) insures a minimum troop strength fluctuation and the continuity of events in the runs, (3) supervises data collection and collation and (4) insures necessary revisions do not invalidate scientific requirements.

In analyzing the results, the scientist established procedures for data reduction and analysis. He also develops programming needed for machine computation. In this phase, CDEC military personnel provide a military viewpoint and furnish military requirements. Military/civilian cooperation has been excellent in the past. While the final decision is the military's, it must be made with full understanding of its impact on final experimental results.

Overall CDEC planning follows two programs. First, in a mid-range study, CDEC wants to know by June 30, 1961, what will be needed in Army tactics from 1963 to 1965. A Pentomic organizational concept, called Pentana, is being used as a starting point. The mid-range program uses the equipment Army expects to have on hand in 1963-65.

On the same deadline, CDEC will submit to CONARC, using the all-purpose unit as a guide, its estimate of Army needs in organization and equipment in 1970.

One experiment, in connection with the mid-term program, is aimed at finding out facts pertaining to company organization and artillery support on the 1965 battlefield. Its goals indicate the scope of the work done at Hunter Liggett.

For the company itself, the CDEC planners set the following study areas: (1) To find the rifle company's ability, operating as part of a combat group, to complete daylight and night attack and daylight defense missions over extended distances. (2) To determine the effect of different types of company headquarters in the assigned mission. (3) To find the amount of military experience and training needed for a commander to lead the company. (4) To find the best possible type of headquarters organization for the mission with the basic unit and with such additions as a tank platoon, an artillery platoon or an extra rifle platoon. (5) To find the extent to which various types of headquarters can maintain communications with its subordinate groups. (6) To study aerial supply

techniques. (7) To find the logistical needs of the company and its attachments.

CDEC also wanted to find the artillery support needs of the company on the atomic battlefield, and asked the following questions: (1) What are the unit's artillery needs, considering both conventional and atomic weapons? (2) How many weapons will be needed, and in what organization will they be most efficient? (3) What will the artillery need in the way of logistical support? (4) Where should the artillery be placed to give the best supporting fire? (5) What will be the best system to find targets?

One run of this experiment stretched over a week. It was broken into seven sections, each designed to give a particular set of answers—the experiments vary, for instance, in the width and depth of the area covered by the group. The entire experiment, in the operating stage is spread over four months.

The Army combat development system is many years older than CDEC. Future oriented officers have long seen that the best way to anticipate requirements, both in equipment, and organization, is to project a group into the future in its operations, before planning time has run out. There has been virtually no use of this system in the past. An obvious example of this neglect was in the use of tanks. In late World War I, the tank was first introduced into warfare by the British, but it was over twenty years before effective tank tactics, in the German Blitzkrieg, had evolved. Especially in this country, there has been traditional reluctance to pay attention to next year's war in time of peace.

The basic theory at CDEC is that, a nuclear stalemate is a strong possibility, returning the actual fighting to the hands of the foot-soldier. CDEC backers feel that while it is highly unlikely that ourselves or Russia will begin an intercontinental nuclear war, there is strong likelihood that tactical atomic weapons will be used. In this line, Gen. Bruce Clarke, who has replaced Gen. Wyman as CONARC commander, has said that it would be impossible to defend Western Europe without tactical atomic weapons. Since there is no precedent for tactical atomic war, the Army is asking CDEC for a few answers—what is the best way to fight on the atomic battlefield, what equipment will be needed, and how should Army organize to be ready?

Besides being faced with atomic weapons, the Army sees that we cannot afford to fight the Communist bloc on a life-for-life basis, with the superior amount of men and equipment they probably will have. So—how can we do the most good, with the least loss, if war comes in 1965 and/or 1970?

One infantryman at CDEC, Col. James C. Taylor, sums it up this way: "We think the road to thermonuclear oblivion will never be traveled and that a massive destruction stalemate, when reached, will be recognized and accepted. If this condition does occur, can we develop an Army which can defeat an enemy quantitively superior in men and material on a battlefield; a battlefield on which small yield atomic weapons are used on tactical targets with selective discretion; can we achieve our national objectives by limiting destruction to that needed to insure victory on the battlefield? We think we can, and this is what we are working toward at CDEC."

One answer to this, drawn from CDEC tests, is that improved mobility offers the best prospect for survival—this could easily dictate low-flying, fast air vehicles in the future. Another necessity in future war will be rapid follow-up of the effects of our own fire. This type of operation will call for maximum mobility and mechanization in Army logistics. Also, a marked decentralization of authority must correspond to dispersion of forces.

In short, CDEC is looking at what will be required to beat the enemy. They do not care which service has a primary role in the war, nor do they care who builds the equipment that is needed to do the job.

They are not trying to prove that a weapon will work. They assume it will work but want to know whether it will be what the soldier needs when he gets it, and has to stake his life on it.

CDEC managers feel that changes in Army organization in the next two decades will be even greater than the change to the Pentomic concept, which will not be completed until 1960.

Nor are CDEC people happy with present equipment. What they want to do is to set up a series of standards for a given piece of gear, and make sure that the Army won't buy anything else unless it can equal or better the on-hand item in a combat situation.

If it looks like a tracked vehicle offers advantages as a personnel carrier, it should be necessary for a wheeled vehicle to meet or better this standard before it is bought. It is the job at CDEC to find out what the tracked carrier will need to do when it is in the soldier's hands. It is conceivable that the CDEC testing system could have a future effect on the present Evaluation Board system. No matter how well a given piece of equipment works per se, it is poor equipment if it doesn't work in a combat situation.

One of the qualifications in selecting CDEC's site was that it should be "in proximity to other services for capability of joint experimentation and should be capable of expansion." The first half of this requirement deserves attention. On the widely dispersed atomic battlefield of the future, there is a strong possibility that close air support, or missile support from ships at sea will be organic to infantry operations. The planned organization base for CDEC's long-range program is the all-purpose unit, essentially doing away with Army branches such as infantry, artillery or cavalry/armor.

The trend is plain. The results of the CDEC experiments could prove the tactical necessity of a unified command structure, in the most absolute sense, with complete cooperation among participating services. At this writing, Marine Corps, Defense Department and the Advanced Research Projects Agency have sent liaison personnel to CDEC. Within the Army alone, there are 18 liaison officers from different branches.

CDEC with proper tri-Service backing can be a final acid test for all future military operations—a Cape Canaveral for combat testing. In many ways, CDEC could be even more important to the country's future than the missile test range, because as yet, we have no enemies on the moon. If a completely integrated sea-land-air fighting force is the answer to winning the war of the future, it is likely that CDEC will find it out. And if this is the case, all three services will have to use the California testing grounds to find out the best way of working together.

Is CDEC on the right track? The military feels they are. Col. Russell E. Miner, Director of CDEC's Field Operations Div., and a former officer with the Pentomic 101st Airborne Division expresses it this way: "I can state without hesitation, that on an atomic battlefield, even one of the 506th Airborne Infantry companies, highly trained, courageous, superbly conditioned, but unprotected, relatively concentrated, and on foot, would be no match for our CDEC experimental company with its organization, tactics of dispersion, armor-protected mobility, and atomic know-how."

CDEC is a new idea, and a young establishment. The true potential of the Hunter-Liggett operation has probably not yet been tapped. But judging from the record which has been set in the first few months of work, Army's Combat Development Experimentation Center will weigh heavily in future military planning. It will give both the Services and industry something to catch up with.

Washington Background

WHO WILL REPLACE GENERAL E. W. RAWLINGS, up for retirement in February, 1959, as head of Air Materiel Command, is a favorite topic of conversation in Pentagon corridors. Most logical choice: Lt. Gen. Clarence S. Irvine, current Hq USAF deputy chief of staff for logistics. (So logical in fact, say spectators in the nickel seats, that he probably won't be picked.)

In his favor: he is a proponent of most of the newest ideas being used or set up in AMC; has served under Rawlings; is overdue for a boost; appears to stack up best of all the men on the "eligible" list. Only drawback: as with many of the outstanding military men of the past decade, Irvine has sometimes used more power than politics in getting the job done, has trod on a few sensitive toes which now may try to kick back—logic or not.

Only AF general who carries a comparable list of credentials is current AMC Vice Commander, Lt. Gen. William F. McKee. Black marks against him: he has been at AMC almost as long as Rawlings, is due for retirement shortly after Rawlings, himself.

Your clue to the successor may come in the next month or so. Any Lt. Gen. sent to AMC Hq in that time will automatically become an odds-on favorite for the top man's job.

ARMY IS HOT UNDER THE COLLAR OVER THE CURRENT NIKE VS. BOMARC controversy zipping around Washington—probably more angry than the facts warrant (Possibly because Army always seems to end up at the top of the list when candidates are nominated for manpower or money cuts). What mystifies informed Pentagon observers is where the controversy is coming from. Defense Secretary McElroy is already on record, as of mid-September, as stating flatly there was no choice to be made. The U.S. will use both. Said McElroy, "There never has been a question about the need for both missiles." Say the observers: as with a good many other arguments of which the military has been accused, Nike-Bomarc is primarily a newspaper debate by overly imaginative reporters.

VALUES OF POLARIS AS A STRATEGIC WEAPON ARE CREATING a vexing anomoly for Defense Department's "Show the Flag" deterrent diplomacy. Unlike SAC or the U.S. Seventh Fleet, which can wave their retaliatory muscle for all the world to see, the very assets of Polaris (ease of concealment, mobility, small size, undetectable launch) cut down its possible use for psychological effect in troubled world areas. So say military diplomats in the international security field.

Replied a Polaris project officer: "Now, in addition to all our other troubles, we'll probably have to develop a whistle for the (Polaris) nose cone so everybody will know when it's coming."

DEFENSE SECRETARY NEIL McELROY REPORTS MAJOR CHANGES are in the works in research and procurement—tied up with current Pentagon reorganization. Research alterations are awaiting appointment of new research and engineering director; announcement due probably this month. Result of a year-long study, the procurement changes (proposed by Assistant Defense Secretary E. Perkins McGuire) are being checked out with industry. Any changes here may take a couple of months—or longer—to jell.

SPEAKING OF PROCUREMENT, DOD has put back into the closet the "Fourth Service of Supply" concept—as a result of evaluations from this same procurement study group. According to informed sources, creation of Armed Forces Supply Support Center (in July) was their major recommendation in this area. DOD has set up AFSSC as a central information and coordinating group, will leave actual supply control in the Services. Footnote: AFSSC says all government-procured material will be under Federal Catalog Numbering system by year-end.

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AF/Industry Relations— What Air Force Wants

Lt. Gen. C. S. Irvine
Deputy Chief of Staff, Materiel
U. S. Air Force

First in a series on the government-industry contractor relationship. Beginning next month Armed Forces Management will present some of the headaches industry faces in dealing with the government. Object: to give top policy and procurement officials greater awareness of the problems faced by your industrial suppliers. . . .

HOW do you let thousands of military contracts, spend millions, and go to bed at night confident that you are getting the maximum amount of quality hardware per taxpayers' dollar? What do you do to acquire this kind of confidence?

These questions represent a monumental challenge facing every procurement official in the Department of Defense. Our senior procurement people normally have experience in the technical fields in which contracts are negotiated. We are responsible to Congress and to the citizens of the United States for guaranteeing the technical effectiveness and timely availability of every item necessary to fulfill our defense mission. We are further responsible for assuring the reasonableness of the prices we pay.

As Air Force Deputy Chief of Staff for Materiel, my constant companion is the awareness of these responsibilities. The same, I am sure, is true of General Rawlings, Commander of AMC, and of the people who work for both of us. Unlike the pilots who can park their bombers and interceptors and walk away from them, we can never walk away from the procurement problems confronting us.

Because of this constancy, and because I have been associated with materiel buying matters for most of the last twenty years, I have reached certain conclusions where Air Force-contractor relationships are concerned. Some of these are concepts. Some are policies. Some are little more than reflections. All, however, are aimed at solving the question: "How can we get more real defense and deterrence for the money we spend?"

One such thought pertains to the real commodity the Air Force "buys" when it lets a contract. Ultimately, of course, it obtains an aircraft, a radar system, a missile or ground support equipment. Initially, however, when the Air Force negotiates a contract, especially major development-production types, it is actually taking a lien on the brainpower of the recipient company's top management.

There is no shelf item to look at, to examine, and to test. Frequently, there is nothing to go on except a sheaf of drawings, books of data compilations, paperwork proposals regarding schedules and subcontract structures, and the past performance of the company in these critical areas. From these documents, which are the essence of a company's management ability, we draw conclusions as to soundness of design, dependability of the engineering staffs, efficiency of the production capability, the reasonableness of the subcontract plans, and the company's sincerity of interest. These, in turn, form the basis for measuring a company's management capability—and for finalizing contract commitments.

While on the subject of dealing with company officials, there is another topic to which I have given a lot of thought. That is the matter of their calling on influential citizens and on Governmental officials to help them obtain contracts. Companies that *can and do* produce the best results need no such intermediaries or "cause-pleaders." As a matter of fact, our procurement regulations require that potential contractors be considered solely on the basis of solid performance.

I fully realize that this is a thorny matter to write about. However, it is a factor in overall Air Force-industry relations. I believe—that such requests for intercession would be far less frequent if companies proffered more promising management and more effective work performance to begin with.

As to contracts, themselves, fixed prices are always preferable, and the Air Force would much rather let this type. However, we recognize the necessity for cost-plus contracts in the research and development area and in certain development-production situations. In such cases as these, the management brainpower mentioned earlier, and the company's records of integrity and past performance jointly guide our selection of the contractor.

With either type, we respect the right of companies to make a profit; this is in keeping with the free enterprise system of doing business. It is my belief, however, that the best atmosphere in which this business can be conducted is one in which fair profits are made *while reducing total costs.*

In other words, incentive profits based on overall cost reduction help the taxpayer get maximum defense hardware per dollar. Incentive profits based on super *contract* performance and on superior *hardware* performance substantially aid the Air Force in being able to fulfill its defense missions more effectively. For these reasons we are including incentive profits clauses in more and more contracts, fixed price as well as cost-plus types.

As a further step in improving Air Force-industry relations, we are giving thought to establishing criteria for post-contract analysis. This will be an objective appraisal of contract performance history for use by the Air Force; and it will be available at any time to any legally authorized agency that needs to know just how a company fulfilled its commitments.

Clearly, the high cost of today's defense materiel warrants the most serious thought that can be forthcoming from *both Government officials and industrial leaders.* Sound steps must be taken to provide superior equipment sooner and at reasonable total costs. And they must be taken now. If we are to have the kind of Air Force this nation needs, and if we are to obtain it at a price that is fair to taxpayers and industries, improved management will have to provide the necessary environment.

ADSID . . . .
New Single Manager For Air Defense?

Man is not fast enough or accurate enough to cope with the high, fast-flying weapons which will be used in the future.

by Fred Hamlin

EXCEPT for the radar antennas which tower over the rolling, green Massachusetts hills just south of Boston, no one driving by would know that there was any sort of Air Force installation around. But behind these unmilitary hills, there are two long, low buildings which house the Air Defense Systems Integration Division at Laurence Hanscom AFB, Bedford, Mass.

An Air Policeman waves cars onto the base with only a passing glance, and the base itself fits unobtrusively into the peaceful New England countryside. It is not until you walk into the ADSID buildings that you realize how important their work is. In the main reception room there is only one receptionist—but there are three security policemen, all armed.

The aim is unity of effort at the newly-formed Air Force Air Defense Systems Integration Division—single manager for the AF air defense effort. A vital part of this job will be handled by the Mitre Corp. (called MY-ter), a non-profit organization sponsored by Massachusetts Institute of Technology. The Mitre job is to draw upon industry's resources and knowledge in building a strong Air Defense System and in advising ADSID management. The Air Force will coordinate the efforts of the three commands concerned with ADS. ADSID was formed in March this year to integrate the various and complex components in the Air Defense System. The Air Force reasoning behind forming ADSID is this:

Advancing technology and air defense needs have forced reductions in the research-procurement-operating cycle until these functions are overlapping in time. Air Materiel Command, Air Research and Development Command, Air Defense Command and industry must work almost simultaneously—and with top coordination—to produce adequate Air Defense.

There are also the ever-increasing air defense system costs. Saved time can substantially cut these costs. Overall program coordination can also aid in reducing costs. If each agency knows exactly what others are doing on a given project, unnecessary duplication can be cut to a flat minimum.

From the technical standpoint it was possible in the past to rely almost entirely on man as the mainspring in air defense. In World War II during the Battle of Britain, radar was both scarce and unreliable, and there was heavy reliance on skywatchers. From initial target fix, information was passed—verbally—to a central plotting location, where it was gathered—manually—on a plotting board. From there information was relayed to dispatcher and to pilot—and the final kill was made only when the pilot fired the guns in his plane—by hand.

Today, automation does many of these jobs, but most electronic work is at least monitored by man—and more important, decisions are still made by a human operator. (While a heat seeking missile will hunt down its target, the target must be preselected by the missile firer.) There are still spaces in the system bridged by men. And as long as man is able to translate data for one machine from another, there is no urgent need for the two machines to speak the same electronic language.

Industry, to a degree, can go its own way, making machines with no thought to the overall air defense system. Individual machine specifications are all that must be considered. Some Army air defense systems, for instance, are built to operate without integration with the Air Force SAGE (Semi Automatic Ground Environment) system.

In the future this cannot continue. Man is not fast enough or accurate enough to cope with the high, fast-flying weapons which will be used in the future. The machines must link without man, and the air defense system must react as automatically as possible.

The logical way to achieve coordination in an area as complex as air defense is to create a coordinating

body—a focal point at which all major decisions and programs may be reviewed and compared. This is what the Air Defense Systems Integration Division will provide. It is outlined by the Air Force as follows. ADSID organization "provides for the close integration and coordination of all elements in the Air Defense Mission System . . . (it) provides for the specialized functional treatment of problems within separate staff agencies such as requirements, development, logistics and engineering services . . . Effectiveness, timely scheduling and technical compatability is the product which the staff produces."

Industry liaison, in addition to overall supervision, will be under the Mitre Corp. (The name for Mitre was chosen because of two meanings of the word —in one sense, it is a type of shield, and in another, it is a device used by carpenters for joining wood in building. The first three letters of the word relate to MIT only by coincidence.)

The Mitre Corp. was formed early this fall to aid from an industry standpoint, to provide a sort of management consultant service, and to give technical support to the Air Force.

An excellent example of the type of problem with which Mitre will work —through ADSID—is that of communications, among the participating agencies. A private firm in New York, called Uniword, has made a study of the language problems in electronic data processing, and has discovered that there are approximately 700 words which are used with essentially the same meaning as 'condenser.'

Industry and each of the Air Force commands has its own language. Programming, for instance, can mean the material allocation for EDPS input, overall planning, or time scheduling for specific assembly line items—it all depends who you talk to. Because no work can be done until the ADSID people know what each other are talking about, this will be one of the first and most basic problems the new organization must face and solve.

The Next Step

When the preliminary problems are out of the way, and Mitre and ADSID are in final working order, further decisions will be both frequent and urgent. Where the many air defense electronic systems are to be located—How missile ADS will work in connection with manned interceptors—How much repair time is needed for the many ADS components, and how this maintenance can be planned so as to lose minimum time on the job—What is the best and cheapest way to use Air Defense electronics systems in connection with civil air control—What industry will have to provide in hardware to keep the system up to date. These are only a few.

For the Mitre Corp., the work areas will be those relating to industry—and those in which industry has more ability or experience than the Air Force. These areas would include active participation in policy formulation in such matters as technical compatability, supply, maintenance, retrofit, procurement, production, and scheduling, as they apply to air defense work.

Mitre is under a Board of Trustees headed by Ford Foundation chairman H. Rowan Gaither. President of the non-profit group will be C. W. Halligan, Bell Telephone Laboratories' director of military engineering. At present, the Mitre job is in the hands of Massachusetts Institute of Technology personnel, generally drawn from the Semi Automatic Ground Environment (SAGE) project at MIT's Lincoln Laboratories at Laurence G. Hanscom AFB, Bedford, Mass.

"They are forming and have pretty much defined the Board of Trustees," according to one MIT official. Although not yet final, the projected list of board members will probably include Lloyd D. Brace, president of the First National Bank of Boston; H. Rowan Gaither; Franklin R. Collbohm, president of RAND Corp.; William T. Golden; E. E. Huddleson, Jr., of Cooley, Crowley, Gaither, Godward, Castro and Huddleson; Maj. Gen. James McCormack (USAF, ret.), vice president of MIT; Robert C. Sprague, president of Sprague Electric; Julius A. Stratton, acting president of MIT; and William Webster, executive vice president of the New England Electric System. Mitre will take over its full mission as soon as possible.

Staffing will be gradually built up, as dictated by AF needs. (The only full time members of the present Mitre staff are an Administrative Secretary and a Military Liaison Officer.) MIT estimates that within the year the Mitre project will employ from 600 to 700 people. By Jan. 1960, this should grow to an 800-1000 population.

ADJSD, commanded by ARDC's Maj Gen. Kenneth P. Bergquist, is described by AF Secretary James Douglas as ". . . an organization capable of supplying the desired systems analysis and systems management functions. The USAF has come to the conclusion that such an organization must consist of military representatives from the Air Research and Development Command, the Air Materiel Command, and the Air Defense Command, backed by a thoroughly competent technical staff, in the form of a central technical contractor." Behind this idea there has been considerable thought and careful planning.

In 1956, the Hutchinson committee gave the Air Force a report which had been two years in the making, and which, like several other AF and industry reports at the time recommended a single manager for the Air Force air defense program. It was in these reports that ADSID and Mitre had their beginnings. These reports were followed by meetings of top AF and industry officials, culminating in the Air Defense Systems Management Office (ADSMO). It was decided in 1957 that ADSMO was not enough for the job, and out of this decision grew ADSID.

The Background

ADSID was authorized and given responsibilities in AFR 20-13. Under this Air Force Regulation, the following jobs were assigned to the new office: (1) Assemble and maintain a current master plan and schedule for development and implementation of approved additions and improvements to the Air Defense mission system. (2) Assemble and maintain a current set of individual system performance specifications. (3) Conduct analysis and initiate necessary actions or corrective measures to insure compatability and effectiveness of components, systems and supporting activities. (4) Monitor progress of actions and insure coordination with respect to development, implementation, plans, schedules and funding.

Also, (5) Assist ADC, ARDC and AMC in forming their plans as they pertain to the Air Defense Mission. (6) Develop test concepts to be used as a basis for systems testing programs. And, (7) Evaluate requirements, established by other agencies, which affect the air defense mission system.

As summarized by Air Force Chief of Staff Gen. Thomas D. White, the ADSID job is to "provide the necessary managerial guidance for command action required to insure an effective, properly time-phased and technically compatable integrated Air Defense Mission System, in accordance with approved plans, requirements and procedures."

Although Mitre is "not much more than a name right now," it has already received a $1.9 million subcontract from MIT. Eventually, the overall Mitre-AF-industry program will fall roughly into a coach-coaching staff-team relationship, in the same order. Although industry said "thanks, but no thanks" to an early Air Force suggestion that they handle the Mitre job, they have since promised to "work closely and support the idea to the

Nth degree," according to MIT.

While Mitre follows the Ramo-Wooldridge tradition of AF/industry cooperation, there are minor differences in the two. According to an MIT source, Mitre is "basically the same thing on a smaller scale." While R-W works solely with research and development, Mitre will have to integrate its efforts with three Air Force commands—ARDC, AMC, and ADC. Another difference between the two is the end product—while R-W deals in hardware, it is more accurate to characterize Mitre as a brand of super management consultants. Mitre has no laboratories and no assembly lines, but deals with improving decisions and decision making. On the other hand, one of the basic Mitre functions will be to furnish the Air Force with technical compatability studies, a function more closely paralleling that of Ramo-Wooldridge.

Another way of defining the ADSID/Mitre job is in relation to Lincoln Laboratories, where Mitre's initial personnel will be drawn. While Lincoln has in the past, and will continue to handle the research half of research and development, the latter phase—administration and integration—will fall to ADSID and Mitre. Presently, many Lincoln personnel have been carried along with their projects past the basic research stage (SAGE is an excellent example of this), and into areas of administration where they are not as familiar with their work. It will be ADSID's duty to release the Lincoln Lab personnel to their former basic research work, and to take over general system coordination.

For the Future

ADSID has a tremendous potential, and promises to be one of the busiest offices in the Air Force. As Air Force officials are quick to point out, each breakthrough achieved in the ADS area is usually followed by a host of new problems created by the breakthrough itself. In addition to this, there is the tremendous problem of coordinating the machines, men and concepts used by the four participating groups. Even without these specific problems, the present Air Defense System offers enough to keep parts of the three services and the Department of Defense busy on full time basis.

But in spite of this, present thinking at ADSID and the Mitre Corp. is geared to the future. When the Air Force has its own air defense house in order, similar problems will exist in coordinating the ADS efforts of the three services and DOD. To quote one AF officer, "Although we here are not pushing for this, we have carefully laid the foundations." An MIT spokesman is more to the point: "I don't see how it can be avoided."

The question of Bomarc versus Nike-Hercules is presently dominating much DOD time and thought, and new problems will be created when Advanced Research Projects Agency gets further along in its anti-missile missile work. If the theory behind ADSID—a single service single manager for air defense—becomes a workable reality, the logical next step is to apply the successful theory on a larger area.

The chances for success seem good for both ADSID and Mitre at this point, although it will be at least another year until a fair assessment can be made. As one AF colonel points out, "We didn't just dream this thing up." ADSID is the result of several years of careful planning, and fulfills a definite need in the overall defense system. As a new agency, ADSID has no record as yet, but backed by an organization with the reputation and experience that is held by MIT, the results of the work should be soon to come and worthwhile.

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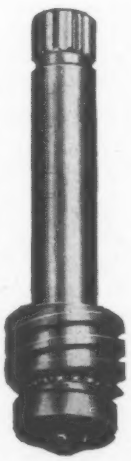

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Procurement and Logistics

MAJOR REPROGRAMMING FOR FISCAL 1959 is underway at the Pentagon. Rising costs could force Air Force to drop one major weapon system from its program, and Navy is reportedly in worse shape.

PERSONNEL REORGANIZATION AT AIR MATERIEL COMMAND in Directorate Procurement and Production reportedly aims at two ends: (1) An answer to proposals in the Stever Report that Air Research and Development Command be allowed to handle its own buying—improved AMC set-up would theoretically do away with this need. (2) To separate policy elements from those parts of the Procurement/Production Directorate working on a day-to-day operating level. Former situation is said to have caused policy-type personnel to be snowed under with day-to-day operations.

CONVERSION OF THE GOOSE DECOY MISSILE TO AN ATTACK WEAPON is a possibility. Fairchild engineers did their job too well, burying metal components of the missile behind a laminated glass skin so effectively that the Goose is nearly impossible to pick up with radar. While this defeats the decoy idea, it could be an advantage in attack.

BOOSTING DAYTON AIR FORCE DEPOT UP A NOTCH within Air Materiel Command is likely within the year. Re-designation as Headquarters, Dayton Air Materiel Area, would be logical result of recent fast increase in Dayton's item responsibility, and corresponding decentralization of procurement and production to the field from AMC Headquarters, late in September.

AN EVEN KEEL FOR PENTAGON "BUY" PROGRAMS is a fond hope for fiscal 1959. DOD expects the three services to watch costs and make needed changes, thereby avoiding major reprogramming and out-of-hand expenditure rates.

PROPOSAL FOR "MANAGEMENT WEAPONS SYSTEM NUMBER ONE" is waiting on Air Force Secretary Douglas' desk for go-no-go evaluation. Proposed by an Air Materiel Command group, the system would combine analog computer predicting ability with digital computer accuracy. The two-in-one machine would then give accurate dollar predictions and trends of when and when not to buy during phase out/phase in of major weapons systems, thus preventing wasted dollars. Current stumbling block: Does AF have the money (about $8 million) to build the machine?

INCREASED PRESSURE ON MILITARY TO BUY JET TRANSPORTS is a strong likelihood. While high-capacity jets would further confuse the MATS/Airline wrangle, the greater speed, in connection with such outfits as STRAC, is a strong arguing point. Some Air Force officers are amendable to the idea—jet transport possibilities were one reason C-132 got the axe.

NEW PRICE REDETERMINATION CLAUSES for inclusion in Defense contracts may be issued before the end of the year by Pentagon Armed Services Procurement Regulation Committee. Industry is complaining that emphasis on elaborate cost information required of contractors is overdone.

J83-J85 PRODUCTION SCHEDULE DECISION should be forthcoming from Air Force. Odds are that the JT12 will be incorporated in the program to satisfy Army needs for a lightweight, high thrust-to-weight ratio engines.

WEAPON SYSTEM BUYING, COUPLED WITH TIGHT DOLLAR, is creating tougher competition among contractors, say AMC sources. With Air Force buying fewer and fewer aircraft types, a contractor who misses a bid will often have to wait several years until another prime contract is open in his area. In the past, it was possible to pick up another contract by waiting a few months.

$39.6 Billion Okayed For '59 Defense Money

The Defense Department budget for fiscal 1959 now totals $39.6 billion in new money—a $1.4 billion increase over the President's original request, and $816 million more than his final request for new defense money.

Largest portion of the money will go to the Air Force, which gets $17.877 billion. Army will get $8.99 billion and Navy will receive just under $11.6 billion. The remaining funds will be used in OSD and for interservice activities. These figures exclude military construction/mutual aid money.

For the first time since the Korean War, Army got new money for purchase of missiles and equipment. Until now, Army had been living off surplus funds left over from the Korean war. The President had originally requested $1.623 billion in this category, but Congress raised this to $1.669 billion. Army also got $498 million for research and development.

The president's request for $10.7 billion for the Navy was upped to $11.3 billion. Cause of the difference is in the number of Polaris submarines authorized. The Administration originally wanted three, increased this to five in a supplemental budget, and finally got nine of the missile subs.

Navy did *not* get authorization to let contracts on a second atomic aircraft carrier, and saw its aircraft and related procurement funds slashed by $55 million. The cuts were in initial spares and administrative aircraft. Also cut in the final budget were Navy funds for aircraft and facilities.

New money for the Navy was increased by $71 million in research and development, and ammunition and missiles funds totaled $602 million—$38.7 million over the original request.

Air Force was given $6.643 billion for procurement of aircraft, missiles and related equipment, representing a $750 million increase over money requested in the principle budget document. The extra money will be used to continue B-52 production. The money provides for 39 of the SAC heavy bombers, and 41 KC-135 tankers, 15 more than the President asked for originally. Congress also gave Air Force $140 million for strategic airlift aircraft, without specifying what type of plane.

In procurement other than aircraft/-missiles, Air Force received $2.22 billion, $24 million over the amended Administration request. Funds for the Minuteman program brought the AF research and development total to $743 million. Maintenance and operations funds were trimmed by $46 million, with a little more than $4 billion in new money now available. Of this, $41 million was cut to "emphasize the need for better management."

Army Gets Go-Ahead To Produce M-14, M-60

Army has received Defense Department approval to begin the $35 million production program on the M-14 rifle and the M-60 machine gun. Under the FY 1959 budget, Army is authorized 70,000 of the rifles, with a $20 million price tag.

Army will produce over 8000 of the machine guns, with cost of $15 million. Both weapons have previously been on pilot line production at Springfield Armory.

DoD Warns Contractors Not to Leak Information

New warnings against leaking information pertaining to contracts, operations and facilities is contained in a recent industrial security letter sent by the Defense Department. Security risks are the basis of the warning.

As a general rule, said the Pentagon, all questionnaires or other requests for information from the government should have Bureau of the Budget approval in order to be answered. "This also applies," said the letter, "to the collection of information by commercial research and management organizations, trade and business associations and organizations, university research groups . . . representing themselves as agents of the government."

Some segments of industry feel that the Pentagon Industrial Security Programs Division has failed to consider the many hundreds of reports required under the terms of industry contracts which do not have DOD approval.

AF Procurement Rundown Given by AMC General

Air Force currently requires $10 billion annually from industry in its procurement programs, according to Brig. Gen. W. A. Davis, deputy director of weapons systems, Air Materiel Command. Of this figure, $6 billion goes for new weapons, and $4 million is for support hardware.

This business is placed with 4000 prime contractors, and in turn goes to subcontractors who represent "roughly a quarter of the total manufacturing facilities in the country," said Davis.

Davis also told a meeting of the New York State Procurement Conference about the AMC way of doing business under new rules. AMC, he said, will originally buy all new manned aircraft, aerodynamic missile systems, airborne electronic gear, fire

Air Force firefighters demonstrate aluminum-coated heat protective suits which will be used by AF emergency crews. Three-piece suits are worn over present bunking clothes, reflect 90% of radiant heat. AF has ordered 20,000 suits.

control systems and navigation systems through AMC's Dayton, Ohio Headquarters. AMC will also buy specialized support equipment for specific weapons at Dayton.

Ballistic Missiles and their support equipment are purchased at the Inglewood Calif. Ballistic Missiles Office, and the Rome, N.Y. AMC office buys all ground electronics systems needed for communication and control of flying operations.

Support and follow-on equipment, which Davis called one of the biggest procurement jobs is handled through eight materiel areas and four specialized depots. Buying criteria were listed by Davis as (1) quality, (2) timely performance and (3) the matter of costs.

Navy Fights Jet Noise, Buys Sound Suppressors

In a move designed to combat jet noise, Navy has bought 132 portable sound suppressors. Initial cost for the purchase is $1.4 million.

First eight of the suppressors will be delivered this month, and the initial total of 132 should be delivered by February 1959. Thirty of the suppressors are expected to reduce jet engine sound, levels by 20 decibels, while the other 102 are expected to cut noise by 25-35 decibles, a reduction of roughly 22%.

The suppressors will vary in size from 12-16 ft. in length and from 6-12 ft. high. They weigh about 2,500 pounds and will be mounted to fit against the exhaust of jet engines under test, or in runup prior to takeoff.

Advanced suppressors which will decrease jet noise by 45-55 decibels (nearly 90%) are currently under development. Total cost of the advanced development program now underway amounts to $570,793.

Symington Criticizes Post-Sputnik Spending

A scant 1.3% increase in defense spending since Russia's launching the first Sputnik, when balanced against the depreciation of the dollar, has resulted in less actual money being spent on defense. The above charge was made recently by Sen. Stuart Symington (D-Mo.) appearing on a New Orleans television program (Dateline Washington, WDSU-TV).

Symington further said that he didn't feel the U.S. could match the Russians in all categories. He also felt "that we are building a great deal of our defense on the basis of tradition and not nearly enough on the basis of progress . . . we put $6.5-7.5 billion into one weapons system which I think is totally unnecessary from the standpoint of future war. On the other hand, the shocking lack of any real production effort on our long-range missile plans and programs is slowly getting to the American people."

A "fiscal strait jacket," he charged, has resulted in the Pentagon from Administration failure to carry out the idea "that there would be no restraint in our effort to attain and maintain a position of equality . . . in the modern weapons with the Soviets."

Symington said that Congress appropriated "a great deal more money than the President asked for" but that it could not force DOD to use it. Citing the Rockefeller Report and a study by the Committee for Economic Development and the National Planning Assn., Symington said more could be spent on Defense without hurting the economy.

Monthly Buying Reports Asked of Services by DoD

Army, Navy and Air Force have been asked to submit monthly procurement reports to the Office of Supply and Logistics in the Defense Department.

The four-part reports will include (1) summary of all procurement actions, (2) procurement actions of $10,000 or more by programs, (3) listing of individual actions totaling more than $10,000 and (4) military procurement actions for experimental, developmental or research work.

Defense has also asked for quarterly reports which will show contract distribution geographically, effect of competition on military procurement, contracts negotiated under emergency war powers and contracts involving more than $10,000 placed in labor surplus areas. Semi-annual reports are also required covering negotiated procurement, total procurement by company and total procurement by pricing provision type.

Contractor Guidelines Drawn for Missile Work

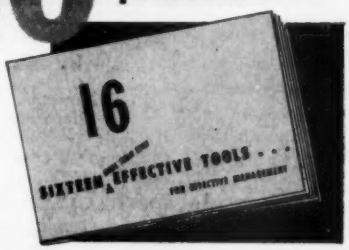
Guidelines for manufacturers seeking missile work have been set down by Robert J. Gutheim of Office of the Director of Guided Missiles. In determining whether missile contracts would be attractive for the manufacturer, Gutheim suggested that the following points be considered:

(1) Missiles use almost every science and technology to maximum knowledge and skill. (2) Missiles demand high, uniform, repetitive quality. (3) Missile environment criteria are much more severe than for conventional weapons. (4) Missile tolerances are 10 or more times more exacting than the weapons they replace. (5) Materials, tolerances and quality required in missile work create peculiar manufacturing needs. (6) Missile and operating system complexity is extremely high.

Also, (7) The missile office strives for infallability, and has found itself justified in paying for premium quality and workmanship when high operability and reliability is assured. (8) There is a high single shot cost, and a high single shot loss in case of failure. (9) There is an extremely high obsolescence rate. And, (10) shelf life, operability and preventive maintenance must be built into the missiles.

Gutheim also said that the complexity of missiles and missile systems has resulted in the prime contractor having only a few of the needed skills. But, he said, the prime has the ability to manage and the responsibility of breaking the job down into segments that can be delegated and subcontracted.

16 ways to cut costs in defense production



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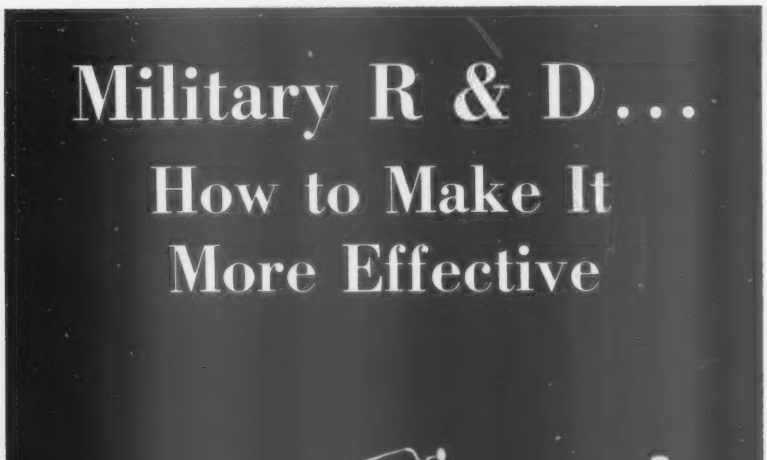


by Marvin E. Mundel

Vice Director, the Management Center, Marquette University, Wisc.

Ways to speed U.S. military research and development, in the face of current Russian progress, have received a good deal of discussion, and have included: increasing expenditures; improving educational facilities; giving greater encouragement to research people, better information digests to scientific personnel; exercising greater care in selection of researchers.

One seldom-considered way to stimulate research output would be to remove or reduce the perennial conflict between "managers" and "researchers" within the government. This conflict, based upon certain inevitable features of the government establishment, is not, in itself, inevitable.

The recommendations noted here will not conflict with currently-being-discussed approaches to improving the research effort, but ignoring these recommendations may largely nullify the effects of other approaches. . . .

MANAGEMENT, to my way of thinking, is the task of designing (laying out plans for work to be done), predicting the performance of and controlling (continuously comparing performance and plan and taking action to assure conformance) a human-group activity, the related physical facilities, and the inter-relationships of the two.

The basic contribution of the managers who perform these functions is *to make the decisions necessary to accomplish assigned or assumed objectives.*

Within a large organization, managers operate in three somewhat indistinctly separated "decision areas." (These are usually associated with three different "levels" of management, which also have somewhat hazy borders.) The three decision areas and managerial levels are:

1.—Decisions concerning the relationship of the organization to external economic, situational and political factors (top managers). These decisions lead to broad statements of policy or objective.

2.—Decisions concerning how, within the policy framework, to achieve the broad objectives (middle managers). These decisions result in plans for action and this group is often the one most commonly identified as "operating managers." It is to be noted that a communication channel must exist between this group and the one above and below it for the top managers' group to make decisions on a realistic basis.

3.—Decisions concerning the day-to-day carrying out of action plans (supervisory managers).

In the usual organization, each level of management may have staffs (individuals who act as data-gathering or data-digesting extensions of the managers), particularly when either the complexity of the data on which the decisions are based (decision difficulty), or the number of decisions per unit of time (decision density), exceeds the capacity of the individual with decision-making responsibility.

These staffs, in general, attempt to alleviate the effect of high-decision difficulty, of high-decision density, or a combination of both by activities such as:

1.—Dimensioning management designs by means of work count, work measurement, quality specifications, etc.

2.—Routinizing and channeling information to reduce legwork and to compile the necessary data into comprehensible form.

3.—Making management designs (such as job methods, procedures,

production sequences, etc.) to eliminate minor decisions from clogging organization channels.

4.—Monitoring and reporting on conformance of management designs and organization performance, both to assist supervisory managers and to evaluate action plans as well as to provide a comprehensible experience basis for future policies and plans.

5.—Recommending many decisions to top and operating managers based on their (the staffs) concept of the objectives.

The above functions are frequently referred to as "management engineering" or "industrial engineering" functions, although there are other staffs who also perform some of the same functions in different activity areas.

Even a cursory view of an Armed Force's establishment of the industrial type (such as an Army Ordnance activity) will quickly reveal the high-decision difficulty of most of the managerial jobs as well as indicate the high-decision density caused by the logistical nature of the assigned missions. It is, therefore, not surprising to find numerous staffs assisting the managers.

Now, what has this to do with research improvement?

Research is an inclusive word. In the Armed Forces establishment it refers to:

1.—*Pure research.* The observation, codification and interpretation of novel phenomena for their own sake, such as the projects sponsored by the Office of Ordnance Research. Or we may quote Von Braun: "When we do what we don't know what we do." (Note, according to the Acme Reporter of Dec. 1956, this type of activity accounts for only 5% of *industrial* research funds.)

2.—*Applied research.* The observation, codification and interpretation of novel phenomena directed towards a specific objective.

3.—*Developmental research.* The perfection of a specific article.

4.—*Research support.* Direct support work for all of the three above categories. This support work is usually primarily routine in nature and often resembles true production activity. It may be such as data collection, data reduction and tabulation, equipment construction, procurement, test replication, etc.

All of the first three categories of research, as listed, frequently contain large amounts of the fourth, a fact usually disregarded by the researcher who concentrates on the true research aspect of "novel thinking and logical deduction and validation in new directions." And it is this researcher's view that is all too often disregarded by those who would apply the normal production management techniques to all research activity.

Here we have just one of the aspects of the conflict between managers of the establishment (and their staffs) and the research groups—a conflict caused by a failure to realize the similarities and the differences between the management of production and research.

The management of a production facility relates to an assigned physical, and well specified, mission such as a "hard" product or an economic objective with numerous possible avenues of accomplishment, many of which may have relatively equal merit. A research facility has the mission of producing a relatively unspecified product, the details of which cannot be described *a priori*.

On the other hand, there are similarities between research and production. In general, I would say that there are those areas of research where one can, for a relatively reasonable span of time, specify in advance: (a) What is to be done; (b) How it is to be done; (c) What the result will be (its form, if not its meaning).

In these areas, the usual management engineering techniques could be applied with their usual extreme usefulness and economy. As was previously stated, in the definition of research, there is more of this last-mentioned type of activity in research than one, at first glance, might expect. Research is all too often assumed to be a mystic, mental activity.

Why do "managers" and "researchers" conflict over these differences in concept? Why does not the above discussion lead to a better understanding of the similarities and differences in the two basic types of activity—production and research—which are being performed and managed?

The problem lies somewhat deeper than mere differences in concept.

Research in the government establishment, (and particularly in the Armed Forces) has a two-phased objective:

1.—To produce knowledge to meet needs.

2.—To obtain maximum performance of the research task at the minimum feasible cost and to thereby justify performance of the research both from the viewpoint of assuring the performance of the mission and for the purpose of being allowed to continue the activity.*

It should never be forgotten that the top managers of a government establishment are in reality charged with the responsibility of determining their mission (severe castigation follows failure to do so) and then separately with the responsibility for periodically "obtaining permission" to perform this mission (the use of tax monies) from the public thru representative government and budget mechanisms. Further, the duality of public and representative government does not always act as a free or logical agent. In private organizations the research function may balance its cost against income money, which if not used might be mostly tax, or compare its results to profits from previous activities. Neither of these types of "justification" is commonly available to the government enterprise.

It should also be noted that the manager is continually aware of the second aspect of the research objective and may at times seek, or almost be driven to seek, more assurance of performance per period of time than the situation really permits.

The researcher all too often thinks of his mission assignment in terms of the first phase of the objective and resents spending any time having anything to do with the second part of the research mission. Here, I believe we find the basic area of conflict—a difference in understanding of mission and the consequent motivations of the two parties. Each seeks to optimize a different aspect of the mission (suboptimization), but a peculiar balance must be struck between the two if we are to obtain true optimal performance of the total mission, considering government "climate."

Unfortunately, this conflict is frequently enhanced by personality differences. Dr. W. A. Key, chief civilian scientist of the Naval Ordnance Plant in Indianapolis, has summed up the personality problem succinctly, as follows:

> "The performance of the essence of the research function is an intensely individual creative act, bringing to bear personal talents without predictable outcome. The process is more of an art than a science, though the applied talents embrace scientific knowledge. Research is, therefore, highly dependent upon people of unusual attributes (and often, unusual personalities) more than is the usual case in other organized endeavors. Consequently, a difficult management and communication problem is created *a priori*."

The manager speaks of "justification" to the researcher, who often feels research is its own justification. In self-defense the researcher resorts to the unintelligible jargon of his specialism and the rift deepens into a chasm that becomes increasingly difficult to bridge.

*See *Executive Order 10072 of August 1, 1949.*

The obtuseness that can develop on both sides may be human but it neither helps nor is it easy to overcome once it is initiated. As will be discussed later, this fundamental difference in mission concept and interplay of personalties may lead to many incidents which in themselves are minor, but which in total may lead to a violent disruption of the research activity.

It should also be understood that the manager, operating thru a staff, because of high-decision density and high-decision difficulty, seldom comes face-to-face with the researcher and if he were to do so, the whole organization might bog down. In effect, I am saying the size of the establishment is an important contributing factor to the conflict. The necessary staffs which are primarily motivated to assist in the second phase of the research mission, and the research group motivated by the first phase of the research mission, jointly create an enormous friction area that can and does often absorb a tremendous amount of time on the part of both the management and the research groups and does not contribute towards the performance of either phase. And, it is my firm conviction that in our form of organization, both aspects must be performed equally well.

This may be subject to discussion, but with the distance (physically, psychologically or knowledge-wise) separating top managers and researchers in the government establishment and considering the democratic, governmental matrix that supports the activity, it is inconceivable to me that either phase of the mission could ever be abandoned. The second phase might yield, to some extent, under the threat of dire and immediate national emergency, when we somewhat depend upon intense partiotism to weld the two phases of the research objective into a single objective for each person and grant somewhat of a "blanket" permission for an activity.

To return to the basic area of conflict, I believe we will find most reported conflicts stemming from the basic problem of the duality of the true research mission and the tendency for any one individual to attempt to suboptimize one phase of it.

For instance, research and development units are commonly in conflict with procurement. Procurement is charged with the responsibility for maximum intrinsic economy of purchase. This may conflict violently with economy of the research program. This is merely a conflict of the two phases of the mission. I remember in one case receiving, one year after requesting it, a tape recorder for a research project. The delay was due to the purchasing department making inquiries and tests to select the most economical tape recorder for this and all future requests. (It is worth noting that the project was actually performed with equipment borrowed outside of channels from a friend in a nongovernmental establishment but not without aggrevation.)

Or we find research groups zealously guarding their unused equipment from other researchers because of the difficulty of replacement if needed later.

Another common complaint of research groups is the proliferation of reports. They are asked to submit reports on work done, manhours expended on given projects, phases completed, actions taken and so forth. I do not wish to imply that all requested reports concern items of importance to the second phase of the research mission, but some of them do. In fact, some of them may well be vital to this phase but should be forthcoming with a minimum of effort. Unfortunately, all too often the researcher feels that all reports not dealing with the direct subject matter being investigated are a waste of time.

In another case we had a research supervisor furious and vocal. He had dispatched one of his research staff to a conference where he felt the man might gain some information, by personal contact, related to the problem at hand. Upon the return of the traveler it was found that since this was a nonfederally sponsored conference for which permission to attend had to be obtained in advance, from the Office of the Secretary of Army, not only could the travel expenses not be paid but the man was requested to reimburse the government for the value of the transportation request used to obtain common-carrier transportation. The supervisor's remarks on the effect on the man's productivity (see quotation from W. A. Key appearing earlier) were pithy and to the point. Again, I claim this is merely a case of conflict-of-mission phases.

I could cite numerous other conflicts over various Civil Service regulations, pay grades, time cards, lateness, work-measurement reports, working conditions, security, auxiliary personnel or just plain "needling." I remember having one of my own valuable employees, in a governmental organization, brutally badgered into a state of absolute furiousness, thru channels, over a bill for $1.50 that a local business firm claimed he owed them. This, of course, was an overzealous attempt to optimize the climate needed by the full implications of "obtaining permission" contained in the second phase of the research mission.

I have purposely included references to some examples which might appear, on the surface, as trivial conflicts. Taken individually, they are indeed trivial. But in quantity, and the quantity is large, the effects are deadly. In relation to the true essence of research the deterring effect is nothing short of monumental, not only in their own immediate effect but in the long-run resistance they create to any kind of improvement in the internal operation of research of the type defined as "support activity." However, the essential point I wish to make is, these cases cited are not to be thought of as the basic issues. These are but a reflection of the little-understood duality of the research mission.

The real question, having stated the nature of the conflict and the undesirableness of the conflict is, "What to do about it?"

The recommendations which follow are predicated upon five assumptions, as follows:

1.—The usual governmental activity is far too complex to permit managers to operate without the assistance of staff.

2.—The duality of the research mission is inevitable and must be accepted.

3.—Suboptimization of the separate phases is not desirable.

4.—No group responds well (and freely, of course) to the administration of a man whose competence they do not respect.

5.—Competence in an administrator requires sufficient knowledge of the field that is being administered so as to permit him to form adequate criteria for judging the activity that is being performed, whether he "sees" it face to face or with the aid of staff.

It would appear that the research manager (a middle manager) and the organization manager of the governmental establishment (also a middle manager) and the latter's top management must all recognize the full implications of the dual nature of the research mission and fully utilize staff services in optimizing the total mission rather than only one phase. This concept must permeate the entire organization.

This solution is dependent upon both finding an individual for research management whose knowledge gives him competence in both fields (the research subjects and management) and also upon having a line manager who has some understanding of the research problem. Likewise, the research manager must possess certain personality characteristics that were only hinted at in the very short reference to supervisory management. (It should be noted that this key individual is not a common type.) Further,

the above-mentioned individuals must create a broad basis of understanding and a mechanism for making staff activities serve *both* aspects of the research mission so as to serve the goal of full optimization.

Such an individual as the research manager would play a key role in encouraging the research group, in the interests of their own effectiveness, and in the interests of overall performance and economy (full optimization), to continuously extract from the "research" complex all predictable activity and apply relatively normal management-improvement techniques and controls to it. For the residual, they should be encouraged to apply modified controls to bring some order to the activity while avoiding the "regimentation" which they, by their very nature, can be expected to react vigorously against. Some type of performance, time-usage and schedule reports are vital to the second phase of the research mission. Managers far removed from the actual research will be asked to perform their public duty to "justify" the activity. Of course, the managerial controls must be wisely built. However, the researchers must be brought to see the need for the above type of activity if the mission is to be performed with both aspects in view, which is somewhat of another way of saying if it is to be performed. And, of course, the staffs must see the need for minimizing the time demands placed on the research group to perform this second-phase activity.

For some specific but simple examples:

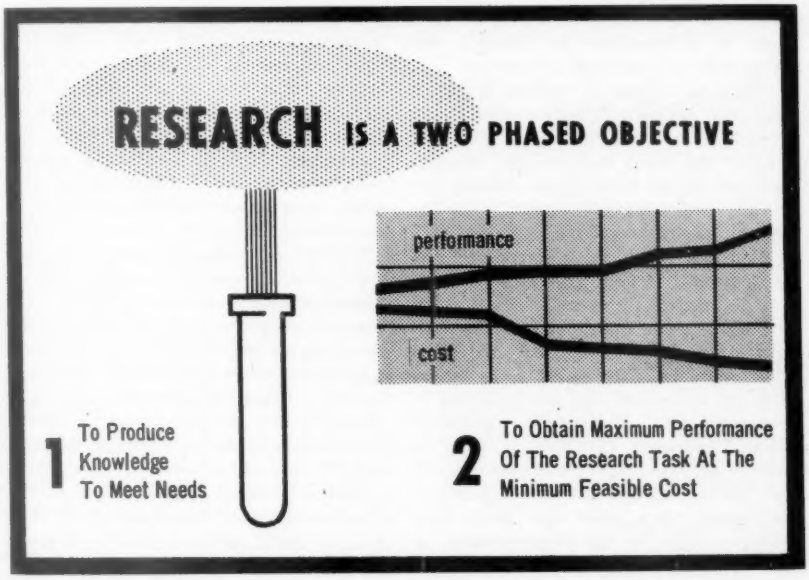
1.—The readying of a range for missile firing should be considered a production-type task (performance rather than product as the accomplishment unit) and performed in a specified manner on a measured standard or performance dimension.

2.—The use of a range may be and is usually planned, scheduled and controlled.

3.—The production of experimental missile parts can be accomplished like job-ordered production, but the two areas of value—direct costs and research needs—must be balanced.

4.—The reduction of data may be improved and performance of this work controlled like production tasks.

5.—The evaluation of data, conclusion-drawing or the creation of novel ideas may only be given a rough schedule, but even a rough schedule permits plans to be made and action to be taken to correct plans so as to economically accommodate necessary changes, perceive the consequences, and meet the second part of the mission. Research groups must recognize their responsibility in this respect.


RESEARCH IS A TWO PHASED OBJECTIVE
performance
cost
1 To Produce Knowledge To Meet Needs
2 To Obtain Maximum Performance Of The Research Task At The Minimum Feasible Cost

Or from another way of looking at it, the typical successful production middle-manager usually has a background of personal experience in production itself (the source of his insight) and is successful because he manages or controls on a formal basis, using modern managerial techniques. The researcher in developmental or applied research must learn to be assisted to achieve much the same results. Research in the Armed Forces' activities has, by and large, like production, grown beyond the "one-man shop" and requires considerable managerial organization, particularly in coordinating a whole technical service. Since assistance can be overwhelming if poorly directed or initiated too far from the point of use, the local installation research managers must play an important role in this area.

On the other hand, the staffs which provide services to research as well as to other parts of the organization must likewise be administered so that they can be of a service to research and must operate with a full appreciation of the varying relationship of the intrinsic cost of their part of the task and the values or costs of the different programs they serve. These staffs must learn various criteria for guiding them in their various submissions.

If clerical routines are an impediment to research activity, then alternative routines must be evolved with their own safeguards. This should be feasible if the research group can be convinced of the importance of all aspects of the second phase of the dual research mission and is greatly preferable to routineless chaos or managing detail "by the each."

In summary, to reduce the area of conflict and thus to increase the effectiveness of the performance of the research function, it is essential that the research group:

1.—Be attached to an organization equipped to accept them.

2.—Have a key-type research manager who joins the group to the total organization.

3.—As a group, know and understand the dual nature of the research function.

4.—Understand the hierarchy of the total organization management and appreciate the nature of top-level policy decisions. As a corollary, if top-level managerial decisions concern research, then there must be an effective comunication channel between the two groups.

5.—Have a service and staff group they can be taught to depend on to give them staff assistance which they are prepared to accept, on the usual basis of accepting staff activity.

It is to be noted that item 5 will only succeed if: (a) the research group understands that this service is to aid them in full optimization of the research mission; and (b) this group performs in such a manner that they assist and facilitate rather than suboptimize the second phase of the research objective.

In short, to increase the total effectiveness of research and development activity within the Armed Forces, looking at it from the managerial point of view, the entire organization must be made aware of and work in some fashion towards achievement of both aspects of the research mission.

Why AMC Wants Integrated EDPE

Air Materiel Command knows it will need fast, world-wide communications — soon. Air Force Combat Logistics Net will solve the problem . . .

by Winton O. Etz

Chief, Communication Planning Group
Directorate of Plans and Programs
Hq, Air Materiel Command

THE Air Force Combat Logistics Net is a world-wide automatic communication system of advanced electronic design, which will provide the means for integrating certain AF data systems. It is a system which will transmit information from a number of input devices, including teletype, electronic data processing equipment, or card transceivers. Information can be received on equipment other than the kind which entered it.

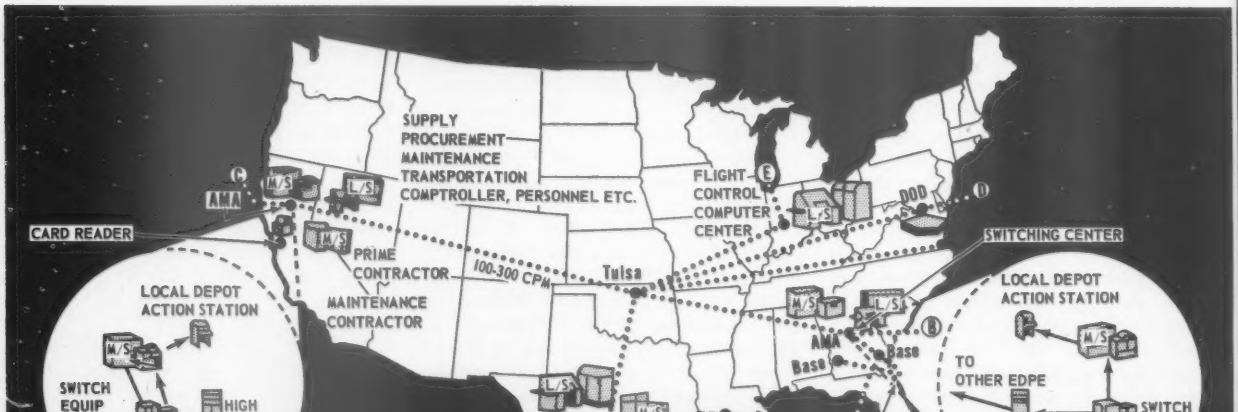
While the system and its components were originally designed to integrate all information flow for the Air Materiel Command Materiel Logistic System, it will also, as finally approved by Hq USAF, handle statistical, personnel, financial and other administrative data through additional circuits for commands including Military Air Transport Service, Air Research and Development Command. In this sense data is information in format, and adaptable to machine processing.

The Air Force Combat Logistics Net will be operational in two years. While it was designed for the Air Force, the ideas behind the logistics net can be used by other services or by any commercial enterprise with dispersed, multiple activities.

The Air Materiel Command now uses several systems for communicating information necessary to operate and manage its far flung materiel support system. Some are AMC-controlled and some are not. In total, however, they do not satisfy the needs of a system not yet relying on Electronic Data Processing Equipment (EDPE). Except for the current card transceiver net, all use equipment and techniques developed many years ago. These nets provide little or no improvement in the accuracy or speed data information handling. Circuit loads are limited, and any increase in traffic volume requires additional circuit outlays. The nets cannot be integrated because of differences in information format and equipment capacity. Practically all the nets require manual paper tape or card processing at various relay or processing centers.

EDPE with random access capabilities, and its use as a major tool in materiel support system operation and management provides an opportunity to speed up materiel flow; to cut down paperwork, to reduce stock piles and to lower pipeline time. In turn, this demands that the system be rid of delays caused by deficiencies in the present communication nets.

The advent of EDPE not only demands improved communications, but has, of itself, created additional communications needs. Although commu-



nication improvement has been an aim of AMC's Data Development Program since its 1954 beginnings, little could be done until the electronic equipment had been selected, positioned and programmed to handle information.

This effort was far enough along in the fall of 1956 to begin definite planning for the communication system required to link the computer centers. But a study of the information of prime concern to Air Force materiel operations and management showed that all necessary information could not be machine-processed. Some, necessarily narrative, could not be put into formats; some, such as drawings, did not lend themselves to such processing; and some, because of economics, could not be processed except by electronic accounting or hand methods. Most, however, had definite time relationships with each other—particularly to the information which would be processed by EDPE. If materiel operations were to be in phase, then the flow of related information also had to be in phase. This would require integration of all information transmitted, immediately after input, into common language for transmission over a common communication channel.

The successful operation of a system which relies heavily on EDPE depends on communications particularly designed to complement EDPE characteristics. These characteristics imposed certain criteria for transmission and relay of information not previously needed.

The machines are highly accurate—incoming data must also be as accurate unless excessive and expensive machine processing is to be forced on the centers. EDPE is a device which invites real time operation. It provides the opportunity for greater, more detailed local comprehension of a current logistics situation than ever before possible.

Timeliness of such information, possible through processing speeds of EDPE, demands a system flow which will insure continuous, fast input/output with automatic error detection/correction insuring accuracy. EDPE also creates problems. One of these is that machines in various centers use different machine languages and require translation to converse with each other.

With these and other considerations in mind, concepts were developed for the desired system. However, realization of these concepts depended on the state of art. If the concepts were too far ahead of commercial development, a suitable system could not be built by the time the computers were ready to function as a part of day-to-day operations. Therefore, considerable time was spent studying the practicability of attaining these concepts. System characteristics and an operations plan were then developed and performance specifications were written for equipment.

The system will use a common language for inter-center communication, but inputs and outputs can be in any language currently used or projected. These include the five hole punched paper-tape, eight bit IBM card code, and the seven bit computer code.

This makes it possible to combine teletype, punched card, magnetic tape and facsimile transmissions, and to send them over one physical circuit with little, if any, error. Large transmission capacities are now available with new, high-speed terminal equipment. These make it possible and probable that all current and projected materiel traffic can be sent over a single wire connecting each center. This will allow consolidation of the AMC nets now in existence.

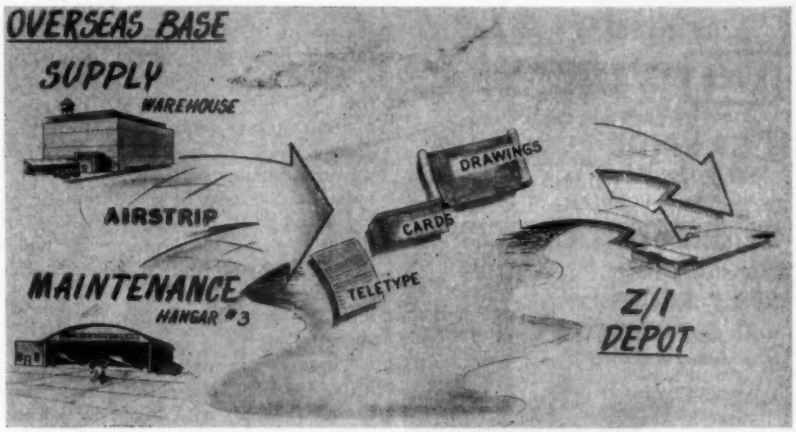
Merging communication means makes it possible to develop a true information processing center at each EDPE Center with communications equipment and message center placed adjacent to the data processing equipment.

In the system there is to be a relay switching center at each AMA/Depot information processing center. Others will be located in the Z/I and at overseas communication centers. This will permit automation of much present manual work, which in turn will reduce errors and handling time.

Air Force bases, contractors and other agencies working with AMC will be terminated at the nearest AMC Center. More distant traffic will be relayed over high-speed, high-volume circuits interconnecting the centers, Traffic will be automatically routed. Electronic devices will scan the address and priority of each message and perform the necessary processing and relaying. Six levels of priority will be recognized, errors will be automatically detected and corrected. Provisions have also been made to automatically select and process specific data in an emergency.

Information to be processed by the electronic equipment will be read into selected tape stations linked to computers on an immediately available basis. Airways and Air Communications Service personnel will operate the automatic relay/switching equipment, supported by contract maintenance personnel. AMC Technical Advisers will assist.

Input/output terminal gear for data, facsimile and teletype will be located near the information user, that is, in depot supply, procurement, maintenance, or statistical services. Also through this system teletype, facsimile and data inputs can be located on AF bases in the materiel areas with immediate access to a depot counterpart through the high-speed allocated wire network, connected to their AMC support manager.



Communications Required for Logistics Improvement.

Studies have shown few if any additional costs will result above those currently projected to meet the needs of an expanded system using present equipment.

The system's operation is explained in the following paragraphs and charts. The basic flow of operational information is from the materiel unit at base level to its counterpart at the Air Materiel Area or depot. The AMC Electronic Data Processing Equipment and its related Communication System exist for one purpose—support of the combat units. Information needed for man-

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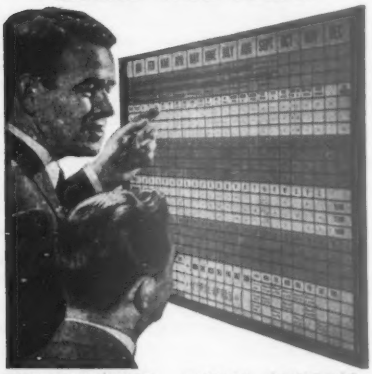

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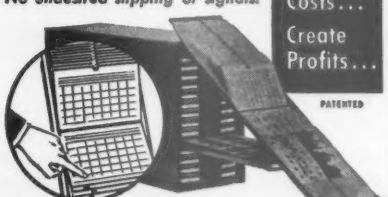

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agement and evaluation is a by-product of this. The closer the information is to the real time situation, the better the support furnished and the cheaper the cost.

Transmission from a given base would be from a card reader, a transceiver, a Materiel Information Flow Device (Base EDPE) or other data input equipment. Data would travel from the base to the automatic switching equipment located at the nearest AMA/Depot. Message coding would identify the EDPC having the master record on the item.

If the EDPC at the AMA/Depot connected directly with the base has this record, the message would feed through automatic relay equipment to a tape station, from there into the EDPE, and then out to a local input-output station, such as a point in a supply warehouse.

If the master record is located at a distant EDPC, the message would travel from original base through relay equipment at the nearest AMA/Depot. It would then automatically switch through high-speed transmission equipment to the trunk circuits, and from there to the westcoast AMA, via intermediate relay centers. At the westcoast AMA, it would be received through high-speed transmission equipment, and passed to the automatic relay equipment. It would then go to the data processing equipment, where it would be referred to a local action station or perhaps back through the relay center to a prime contractor, storage site, etc.

Typical information routing at an AMA/Depot Information Processing Center (EDPC) with high-speed transmission terminal equipment, and electronic automatic relay/switching equipment would be as follows. The relay/-switching equipment contains a high-speed magnetic drum device which can read in and out simultaneously. Information must be read on the drum at the speed it is received from a trunk, a converter or from a base or from manufacturers' output equipment, if not routed via trunk facilities. It will be read off the drum at this same speed. This makes mandatory several demand stations on the device to handle speed variances. With high-speed transmission equipment, data must be read in to the relay device at 3000 bits per second, and read off, through a converter, to the EDPE at a rate of 15,000—60,000 characters per second. Direct base to AMA/Depot and manufacturer direct to AMA/-Depot traffic may move at a slower rate than 3000 bits per second. There will be at least four types of converters —teletype, tape data, card data and facsimile. From the converters, information will be processed to appropriate input-output equipment.

For example:

Teletype traffic will pass from the teletype converter to a teletype machine with the information reproduced on rolls of paper.

Facsimile information—drawings or other documentary material—will pass from the facsimile converter and be recorded on paper, microfilm or other film strips. If on file, it can then be duplicated through projection equipment.

Data will come from the tape or card converter and feed into a tape or random access device which would record the data and hold it in storage until the computer calls for it.

In the Data Processing section of the Information Processing Center, information is received through the high-speed transmission terminal, and processed through the automatic relay/-switching equipment to the data converter. From there it goes into one of several tape stations which are always connected to the line and is read out from the same tape station to EDPE upon its call. The tape stations, each having two tapes connected by a flip flop arrangement, contain major segments or categories of the programs stored in the EDPE. These are fed into the EDPE at such times as the machine calls for the information. This, in the case of inventory control data, might be at the end of every cycle, or information cataloging, at the end of every eight hours. By phasing of the tape stations, there is always input tape available for the communication equipment, and one available for "read in" to EDPE. A reverse arrangement, through an output tape station, is used to move information from the center to the circuit. It is possible to eliminate the present method of card output/input, using the transceiver and card to tape equipment.

In conclusion—this system integrates various means of communication and provides for integration of all information needed to operate and manage the Air Force Materiel System. It provides facilities to handle data for other Air Force systems. The system, through its electronic and automatic features, provides unprecedented speed, capacity, reliability and accuracy with personnel and circuitry economy. It makes possible a modern logistic system with quick reaction time. It will cut pipeline time and eliminate costly stockpile while guaranteeing the combat commander timely, adequate support. Its adoption permits development and application of advanced Electronic Data Processing techniques which should increase EDPE efficiency and effectiveness.

Why Flash Financial Reporting Works At Navy Aviation Supply Office

by Comdr. A. B. Sanders, SC, USN
Asst. Director, Financial Control Division, Navy Aviation Supply Office

DID YOU ever spend days digging into a subject; prepare what you knew was a good 20-page report containing your statement of the problem, findings of fact, and conclusions; and then wait in vain for the CO to act on it? And were you sorely disappointed a couple of months later when you found out that he hadn't even taken time to read it? Most of us have at some time or another, and it's downright discouraging.

But maybe you are one of the busy CO's. How many times have you sought information which you need right now, and received instead 20 pages of gobbledygook three weeks too late? Of course, you don't have time to read and reread it, so you send for the author and try to drag the information out of him by questioning. Again it becomes downright discouraging.

With the Navy's conversion to a whole new family of heavy and complex high speed jet aircraft, business at the Aviation Supply Office is booming. Spending for aviation supply-system stocks during this current fiscal year is planned to run at more than $5000 every working minute. And this must be carefully planned and controlled spending. Never was there greater compulsion to watch every dollar.

Aviation inventory management is big business, too. If we sold the present inventory for cash in one dollar denominations, we could lay them end to end to build more than 90 bridges between Honolulu and San Francisco. Or we could start a bridge out into space and fall just short of the moon. Naturally you recognize these as useless bits of information, but they do serve to emphasize the size of the business which is managed by the Commanding Officer, Aviation Supply Office. This is indeed a fertile field for report writers. Subjects for study and reporting present themselves in an endless parade. How easy it would be to submerge top management in a flood of paper. And how fatal!

Financial reporting to ASO top management revolves around two reports. One is entitled the Dollar Data Flash Report, the other the Financial Inventory Digest. They might well be named Mr. Inside and Mr. Outside, because that's exactly what they are. The Dollar Data Flash Report conveys a picture of the ASO procurement funds situation. From it, management keeps abreast of the internal operations measured in terms of dollars. Here is the story on progress toward procurement goals, backlogs, workload distribution, etc. On the other hand, dollars spent by ASO become aviation supply-system inventory, and the Financial Inventory Digest takes over. This report conveys to ASO management the status of systemwide material. Here are watched inventory trends, receipts, issues, excess disposals and the like.

What They Need

Writers of business management textbooks list various features of good reporting to top management. The two financial reports used at ASO incorporate many of the most frequently listed, and this is perhaps the easiest way to describe them.

Timeliness. Each report is submitted periodically. The Dollar Data Flash Report is made semimonthly; the Financial Inventory Digest monthly. *Each report is in the hands of management within hours after availability of information it covers.* This is in sharp contrast to the normal accounting reports, which grind out about the 15th or 25th of the month following.

Brevity. Each is a 4-page report which contains highly summarized data. Complex tables of figures are avoided; no fact is buried in a mass of detail. Only carefully selected significant figures are reported.

Accuracy. These reports are accurate to the degree needed to convey an honest and fair presentation of the situation. Detailed dollar and cents balancing, so important to complete accounting reports is not needed here. In order to gain timeliness, certain estimates are used (and so noted) where complete information is not yet available.

Simplicity. Each of the two reports makes liberal use of charts and graphs. And a cardinal rule is followed in this: *the same information appears in the same spot on each report.* This is an important feature in any vehicle conveying information to a busy executive. Naturally, we all want to present reports which are attractive in appearance, and which aren't boring repetition. But what CO can afford to indulge in a monthly game of hide and seek for facts?

Pertinent content. Here is a two-way street. A report to top management is of little value unless it contains the information which top management wants, and only that information. Most report originators have ideas as to what information the CO needs, and some prepare reports accordingly. Most CO's also have ideas as to needed data, and some fail to make such ideas clear. In the development of the two financial reports at ASO, this two-way street was walked. The CO, RAdm. John W. Crumpacker, gave precise indications of his desires early in the "game." The result is a periodic dose of exactly the information which he wants.

In summary, it must be mentioned that the type of reporting described here in no way is a substitute for complete and accurate accounting reports. These two report twins at ASO make no effort to push older established reports out of well-worn channels. But they do serve a distinct need which their older and huskier brothers cannot. They convey to ASO management a complete picture at a glance. They bring significant figures which are meaningful in a familiar and recognizable format. And they arrive at the admiral's desk while they are still news. Admiral Crumpacker not only reads them, he refers to them daily.

Does your CO read yours?

ARPA Job Detailed By Top Agency Aide

A picture of the roles and missions of the Advanced Research Projects Agency which took in a lot of territory was painted recently by Lambert L. Lind, Jr., special assistant to ARPA Director Roy Johnson. Lind spoke before the 12th Annual Conference on the Administration of Research in Chicago.

The three broad areas in which he felt ARPA would work were (1) those too advanced to be included in the specific mission of any of the services, (2) those of concern to more than one military department and (3) those which must be handled by an agency not subordinate to one of the services. Lind denied that ARPA's work would be confined to space technology, ballistic missile defense and related research in the chemistry of propellants.

"Military research and development has," said Lind, "been hampered in the past by the requirement that funds be allocated to research only when the product could be immediately identified with a weapon system . . . ARPA does not have this limitation. This means that for the first time the Defense Department is prepared to sponsor pure research against the judgment that it might lead to a valid military application, without proving the judgment in advance."

Lind said that ARPA would work in close cooperation with such agencies as National Aeronautics and Space Agency, and described the DOD office as being "project oriented." Once a project is assigned to ARPA, he explained, "we seek to develop an integrated research and development program formulated to carry out the intent of this assignment. The program is developed through the review of project proposals solicited or received from industry, from universities, from laboratories, from other government agencies, and from the several military departments.

"To the extent that one proposal may be found sufficiently applicable to the program in question, a study contract may be let. We feel under no obligation to accept a specific contract proposal in its entirety. It may be accepted in part. It may be consolidated with others. Conceivably a proposal of our endeavors is to insure the application of the best thought and the best technology available anywhere to the problem assigned," he said.

Polaris Called Unique In Retaliatory Arsenal

An "entirely unique position" in the U.S. retaliatory arsenal is filled by the Polaris weapon system, according to Vice Chief of Naval Operations Adm. James S. Russell. The reason, he said, was because Polaris can be fired instantly and unpreventably—and with annihilating fire power.

Russell also pointed out that the missile, carried by a submarine, combines "the advantages of attack with the already established potential of concealment and mobility offered by the nuclear powered submarine."

"From a military standpoint," Russell continued, "the Polaris armed submarine offers certain unusual strategical advantages as a deterrent and retaliatory weapon. Its launching position cannot be 'zeroed in' for a surprise attack. Its angle of missile fire cannot be calculated in advance for aiming a 'counter missile,' should such a weapon be developed. The target represented by a submarine is mighty small for attack by ballistic missile—even if that target's approximate location were known in advance. . . . Its very mobility, as well as its underwater concealment, would call for wide dispersal of enemy search forces."

The Polaris project, he added, is not in competition with other weapons development, nor does it duplicate any other effort. "It is not an infringement on the role of any other military service, but stands on its own feet providing a form of potential fire power and a strategic use which, quite obviously, no other weapon system—actual or proposed—can duplicate."

Rocket Breakthrough Announced by Bell

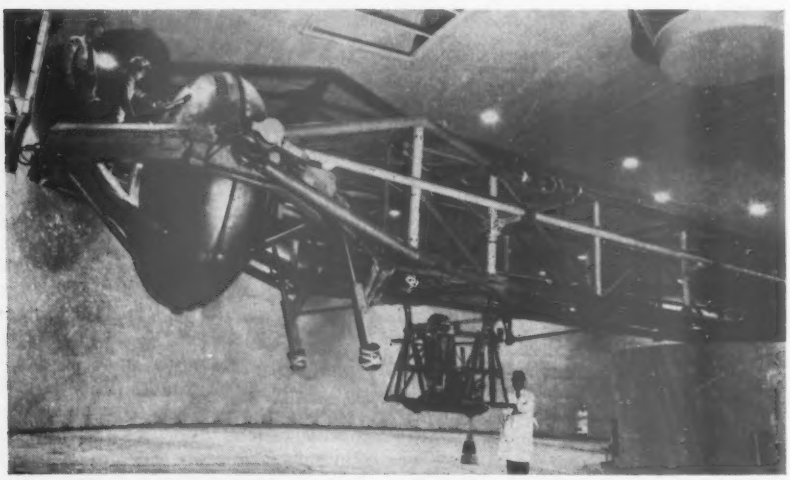
Bell Aircraft Corp's Rockets Division has successfully conducted tests using liquid flourine as an oxidizer in large scale rocket thrust chamber firings. The test is termed by Bell as "the last major breakthrough in chemical rockets."

"We have brought chemical rocket engines close to their ultimate achievement," continued the Bell spokesman. "Beyond this," he said, "lie nuclear rockets or even more exotic forms of propulsion whose practical application is several years in the future."

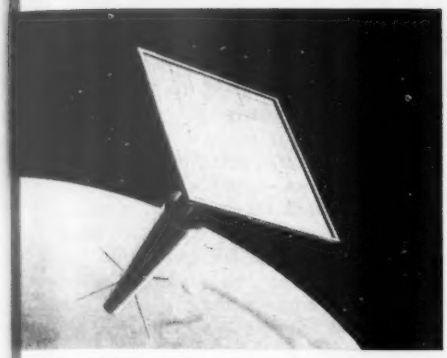
Sponsor of the project was Air Force's Wright Air Development Center Power Plant Laboratory. Liquid fluorine had been previously used in the atomic energy field, and is highly flammable. Combined with water, the chemical produces a combustion temperature of 5000°. Bell claims that the chemical, if used with existing missiles, could increase payloads by as much as 70%.

With existing fuels, the chemical can increase power outputs by as much as 40%. Replacing liquid oxygen, fluorine can step up specific impulses from 245 lbs. per second per pound to 300-345 lbs., depending on the fuel used.

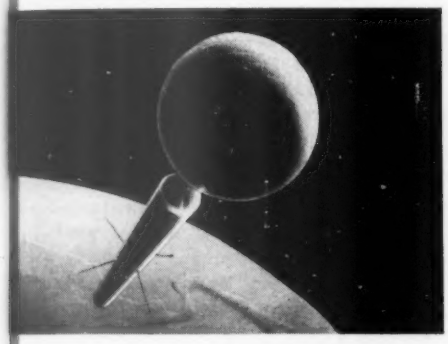
Special metal treatment, handling and welding techniques were developed for the experiment, and storage facilities with -306°F were built by Bell.



Giant Navy centrifuge will be used in connection with X-15 program. Believed to be the world's largest, it is the first centrifuge to have gondola pilot control. Costing $5 million, the machine can accelerate to 180 mph in 7 seconds from dead stop.



Solar energy converters, such as shown here, may solve power problems for space stations and satellites. With 2000-watt output, the larger converters would operate on same principle as solar cells in Navy's Vanguard.



Lockheed X-7 Hailed As Fastest Ram-jet

The Lockheed X-7 ramjet missile is being praised by the Air Force as the fastest, highest flying air-breathing missile in the free world. Although the X-7 altitude record has not been announced, Air Force says the ramjet has flown in excess of four times the speed of sound.

In the record speed run, engine and air friction temperatures burned part of the missile away. The 37-foot missile was dropped from a modified B-50 over Holloman AFB, N.M. at the start of its run. The same engine used in the X-7 powers the Air Force Bomarc interceptor missile.

Nike-Hercules Mobility Proven in Recent Tests

Highly encouraging results have been reported from recent Nike-Hercules tests at Eglin AFB, Fla. Most significant results showed that the Army air defense missile can be "easily and quickly" transported by either land or air.

Nike-Hercules, says Army, "has the mobility essential for the support of Army operations in any part of the world." In other tests, the missile (1) picked off the lead F-80 drone in a formation of planes, (2) was successfully fired near populated areas with live warhead, and (3) was successfully fired in salvo.

Test results also showed that a nuclear-armed Hercules would have scored a complete kill on a formation of three planes. Army also reported that with prepared emplacements, the complete Nike-Hercules system can be set up and ready to fire in a matter of hours. According to one Army officer, Brig. Gen. John T. Snodgrass, a field-type launcher for the missile is now under development which will do away with need for prepared emplacements.

Six missiles were fired during the test series, three fully armed, and three carrying full instrumentation. Atomic warheads were not used.

Air-Dropped Tractors Developed by Army

Two special tractors, entirely air transportable and air-droppable, have been designed by Army for use by future Army Engineers. Both models are called Bats (Ballastable All-purpose Tractor), and they are either tracked or tired.

The small, light vehicles aim for increased mobility, reduced vehicle types, and reduced support needs. Interchangeable parts enable the new tractors to serve as cargo carriers, shop units, liquid transporters, earth augurs or cranes. When the tractors are ballasted (with dirt), they can handle dozing and prime moving operations with twice the work potential of present machines the same size.

ONR Cites Breakthrough In Ship Propeller Work

A breakthrough in ship propellers comparable to the jet propulsion breakthrough in aircraft has been announced by Office of Naval Research. The new propeller is called a supercavitating propeller, and was developed by ONR engineer Marshall P. Tulin.

The effect of the new development is to enable ship propellers to operate at high speeds with an efficiency level previously unattainable. Cavitation is the forming of an air pocket behind the turning prop. By increasing this air pocket until it is longer than the width of the propeller blade forming it, Navy has succeeded in capitalizing on the condition, and stepping up efficiency.

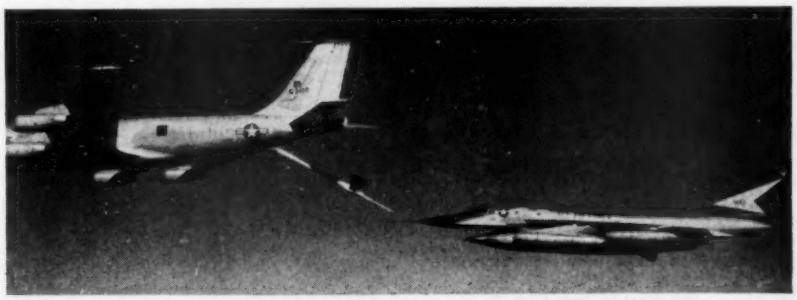
The new propeller design, and resulting advantages are ideally suited, according to Navy, for use with marine gas turbine engines. Navy's Bureau of Ships is currently studying such items as gearing, engine modification and hull shapes with an eye to exploiting the technical advance. National Advisory Committee for Aeronautics is experimenting with the idea as it relates to high-performance seaplanes.

Record Size Booster To Be Built by Army

Advanced Research Projects Agency has authorized Army Ballistic Missile Agency, Huntsville, Ala. to begin work on a 1.5 million pound thrust liquid rocket engine, capable of placing "very large payloads" in orbit.

The booster will be formed of clusters, built around proven IRBM/-ICBM engines, rather than a single new unit. Rocketdyne Division of North American Aviation, Inc. will work on the project under a $2 million contract let by Redstone Arsenal.

"Although the new booster will incorporate many recent developments in the art of rocketry," says ARPA, "existing static test facilities will require relatively minor modifications for the initial project. The propulsion components will be re-packaged to fit the particular need and will provide thrusts substantially over that now available from the standard IRBM/ICBM rocket engine."



B-58 is refuelled in flight for the first time. Fuel transfer was called routine by chief Convair test pilot B. A. Erickson. Fuel plane is KC-135.

Regulus IIs Check Out Over Inland Range

Navy and Chance Vought have successfully launched two Regulus II missiles over the Pacific Missile range. The recent tests were fired inland, and both missiles were recovered.

Navy fired one of the Regulus missiles from Point Mugu, and Chance Vought fired its pilotless bomber from Edwards AFB, Calif. Both tests were under constant ground control, and were accompanied by Chance Vought F8U-1 fighters, which could either take over control of the missiles or destroy them.

GE Satellite Engineer Outlines Sun-Shot Plan

A moon-assisted-take-off has been suggested as a possible means of firing a successful solar probe by R. P. Haviland, a satellite engineer with General Electric Co. The moon's centrifugal force would be used to achieve a crack-the-whip effect on the probe vehicle.

The probe vehicle would be fired close enough to the moon to take advantage of the moon's 3600 mph speed—which would create a sort of tailwind for the rocket. Haviland said that the shot would have to be highly accurate, and for this reason, planets farther away could not be used for the same purpose.

Present hardware could fling a 50 lb. probe as far as the planet Mercury using this principle, coupled with a five-stage, 250,000 lb. rocket.

RemRand, AF Simplify EDPS Communications

An easier way for man to communicate with electronic processing machines has been devised by the Air Force, in conjunction with Remington Rand Div. of Sperry Rand Corp. The system uses a limited vocabulary of English verbs to instruct business-type computers.

The result will be that the businessman can refer his accounting/computation needs to the machines without needing knowledge of the complex computer language. Called the Air Materiel Command Automatic Compiler (AIMACO), the system will initially use 30 verbs, with expansion as needed. The system will replace the task of manually translating English to machine language. The system has been tested, and is currently in limited use. It will be generally used by the end of the year at AMC.

Another advantage of the new system is that machine programs can be quickly altered. Also, time and expense are reduced, and management will be able to forecast processing results—thereby avoiding disruption and unnecessary program changes.

Wire-Guided Torpedo Developed by Navy

Navy has announced development of a wire-guided torpedo, the Mark 39. Resembling a torpedo, the weapon is actually a guided missile, operating in the same manner as Army's Dart anti-tank missile.

Thread-like wire is strung behind the torpedo when it is fired, and over this wire, guidance commands enable the weapon to follow its target until the kill is made. While exact range has not been revealed, Navy has said it is able to close on its target despite maneuver or countermeasures. The Mk. 39 was developed by Vitro Laboratories, a division of Vitro Corp. of America.

Army-Rheem Drone Flies Successfully

Army and the Rheem Mfg. Co. have jointly announced successful flight of a new surveillance drone which is completely controlled from the ground. The drone is currently under test at U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz.

Information gathered by the drone is reported by electronics equipment, and the pilotless plane is said to do in seconds what regular patrols would need hours or days to accomplish. Rocket assisted take off and a parachute landing device eliminate need for a landing field for the drone.

The drone may be repaired easily, and eight complete drone systems can be carried by two standard Army cross-country trucks.

British Missilemen Fire at White Sands

A British Army regiment—which has been firing rockets since 1790—has fired the Corporal at the White Sands Missile Range. The regiment returned to England at the end of last month, where it will fire surface-to-surface missile support for NATO forces.

The tests were run at White Sands pending completion of a British range in the Hebrides Islands, off the coast of Scotland.

High-Thrust Booster Fired by Army

A solid propellant booster with a thrust of "several hundred thousand pounds" has been fired by the Army at Huntsville, Ala. as part of the research and development program on an anti-missile-missile.

Army said the Thiokol booster could fire an air defense missile "to very high altitude almost instantly." Informed sources said that the solid propellant booster had no relationship in the ordinary sense to rocket motors, since its function was as a booster without any sustainer.

Supersonic Kingfisher Tests Defense Systems

A bird of many shapes is the Army's new Kingfisher ramjet-powered target missile. Flying at supersonic speeds, Kingfisher can electronically project just about any kind of aircraft the ground crews want to shoot at.

In addition, Kingfisher is completely re-usable—a direct hit never touches the missile itself, and yet is recorded by the target. The Kingfisher scores hits on an electronically projected target, and can be recovered by parachute.

The missile was built by Lockheed Missiles under a $7.5 million Army contract. It is 38 feet long, weighs more than 7600 pounds, and is 20 inches in diameter.

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Newsletter

Armed Forces Management Association
OTis 4-7193

Room 3D937, The Pentagon Washington 25, D.C.
National President: Rawlings S. Poole
Executive Director: VAdm Harry E. Sears, USN, ret.

AFMA Newsletter is issued monthly by the Armed Forces Management Association through the cooperation of Armed Forces Management magazine to inform the membership and AFM subscribers of the aims, projected programs and current activities of the Association.

AFMA Newsletter becomes a regular feature of Armed Forces Management magazine with this issue. Through this Newsletter, the Association plans to keep its membership, friends and interested AFM subscribers up to date on activities and programs of the organization, and provide information of value in furtherance of AFMA objectives.

AFMA aims and objectives include:

—to make a significant contribution to the existing programs of the defense establishment for improving efficiency and effectiveness in the employment of our national defense resources by:

- Providing a means for the exchange of management knowledge, methods and techniques among the various elements of the defense establishment.
- Providing a means for the exchange of management knowledge, methods and techniques between industry and the defense establishment.
- Stimulating and encouraging individual and collective efforts for improving management in the defense establishment.

Goals in furtherance of these aims and objectives include:

- Full-time Executive Director staff.
- An expanded membership, individual and corporate.
- Improved services to the membership.

Full-time Executive Director now operating and staff being developed.

Build-up of AFMA membership, essential to flow of management knowledge within defense and between defense and industry, **now underway.**

Goal for Fiscal '59—Double the number of chapters and individual members; 200 corporate memberships. **Ultimate goal**—a chapter at every major defense installation in keeping with SecDef endorsement, "The Department of Defense would welcome the establishment of local chapters at every major U.S. defense installation;" 25,000 total membership.

In this connection, new chapter being formed in Spain; individual memberships up 5% in past two months. And—**AFMA proudly welcomes to its expanding family of corporate members:** IBM, RCA, ACF Nuclear Products, Sylvania, Wheeldex-Simpla.

Chapter participation in achievement of these goals a requisite to success, as pointed out in recent letter to chapter presidents. **Chapters exist to further objectives of the Association.** Achievement of goals outlined constitute powerful step toward attainment of objectives and a better AFMA.

NEWS BRIEFS

AFMA members are encouraged to drop in at the new headquarters when in Washington.

The Association's new Executive Director, Vice Admiral Harry E. Sears, USN Ret, addressed the National Capitol and Aberdeen Proving Grounds Chapters recently. Subject, "New Horizons for AFMA."

A limited amount of advertising in COMMAND MANAGEMENT, AFMA technical quarterly, is now being accepted.

Chapter news, for this column, and articles for the magazine proper are requested. Include photos where possible.

Next month: More on programs implementation; services to the membership; industry relations program; educational institutional program.

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McElroy's First Year: The Chair Fits Well

ON Wednesday October 9, 1957—five days after Russia launched its first Sputnik—a tall man with an easy grin walked into a Pentagon press conference—it was his first day of work as the Secretary of Defense. He began by saying "I don't even know whether the chair fits, gentlemen," but in the past year Neil Holser McElroy's increasingly better grasp of the job at hand has shown the chair to fit as if it were built for him.

The 54-year-old ex-president of Proctor and Gamble has had a good year. If the results didn't speak for themselves, the confidence felt in McElroy throughout the Defense system would tell the story. Taking over at a crucial time in the cold war, the new Secretary of Defense lost no time getting into his new job. And he lost no time in making the necessary decisions for the country to stay on top of the world situation.

A scant two months after he had taken office, there was no doubt that the Pentagon was in the hands of an active, powerful personality. On December 9, McElroy had already established the following record:

(1) The former $38 billion defense spending ceiling was lifted. (2) McElroy had formed a single manager for "new and novel" weapons. (3) In answer to Russian space achievements, he had ordered Army to go ahead with its Jupiter-C satellite program. (4) In the same area, he had restored approximately $170 million in appropriated funds to the R&D effort. (5) He had cleared the research and development command & communication channels in OSD. (6) The former 200-mile rule on Army missile ranges was under review, and (7) $400 million had been restored to the aircraft procurement effort.

These were only the preliminaries—the full story was to break shortly after the first of the year, when Congress returned to Washington. In addition to requesting a record $40 billion in defense money, McElroy, working with the President began to form plans for a complete overhaul of the Defense Department.

McElroy's major decisions were many, and it is the major ones which promise far-reaching effects. Army was given a go-ahead on the Pershing missile, one of the first true second-generation missiles to be okayed. An anti-missile missile program was given to the Air Force, consultants were named on the reorganization program and a $1.4 billion bill for supplemental appropriations was sent to the White House. In one of the most important decisions of his tenure, McElroy formed the Advanced Research Projects Agency, aimed at carrying out work with ultra-futuristic weapon and defense concepts.

From April 3 on, McElroy's time was largely spent working with the President's reorganization bill. In addition to the great amount of time he spent before Congress, McElroy was doing all that he could to put the overhaul into effect with Congressional action. The promotion directive for General Officers was re-written to include interservice cooperation as a requisite, DOD committees were told to justify themselves or get out of business, and plans for revamping the Joint Chiefs' Staff were immediately put into the mill. There can be no question that it is a carefully planned, well-executed program. In addition to choosing his advisers well, McElroy was personally in touch with every major decision in the plan. It is as much to his own credit as anyone else's that the bill met with the Congressional approval that it did.

This is the story as it appeared in the newspapers. The true measure of Secretary McElroy's work must be made by the men he works with day by day.

In the smaller ASD offices, there is a definitely favorable opinion of McElroy's programs and work. The reason for this is summed up by Charles Shuff, Deputy Assistant Secretary for Military Assistance Programs in International Security Affairs: "Secretary McElroy is damn well read in to any major decision we make . . . and has taken a personal interest in our work." Specifically, McElroy has taken a great interest in getting missiles overseas, and the NATO Supply Service Center was formed with his "understanding, knowledge and support." On the Military Assistance Program, McElroy has carried on former Secretary Wilson's program to put it under "better, more businesslike management."

In another part of the Defense Department, McElroy has taken an equal interest. Major Health and Medical programs—recruiting of doctors and dentists and Medical Care for dependents—were both supported by the Defense Secretary.

In the larger areas, he has been as active. The Supply and Logistics office has had a "very progressive year, with considerable progress in administration." With such McElroy-backed programs as accelerated item reduction, new policy guidance on industrial mobilization, and establishment of the Armed Forces Supply Support Center, S & L Executive Assistant Robert Holt can say "Supply and Logistics looks strong. More than ever, we are able to react quickly to any logistical situation."

Work in the Office of the Assistant Secretary for Properties and Installations has been directed to three major jobs. These are an active review of military properties to see which can, all or in part, be made ready for disposal, insuring that any new needs were filled, as much as possible, with existing property, and providing family housing for military personnel. Secretary McElroy, says one P&I official, has "supported P&I to insure maximum use of existing military installations in order to avoid new acquisition for new weapon requirements, thus removing additional property from local tax rolls."

The aim of the Assistant Secretary's Office for Manpower, Personnel and Reserve has been for improved quality in the service personnel. In the face of manpower cuts, this office found that it had to weed out of the services low learning ability groups. According to one top MP&R official, McElroy "spent a good deal of time" on an inductee screening program. He also devoted "time and attention" to such

perennial problems as strength levels. The MP&R official also acknowledged the Secretary's "vigorous effort to improve quality" in military and civilian DOD personnel—this, he felt, was "the major thing that McElroy has picked up" in MP&R affairs.

Perhaps the area where McElroy has done the most important work, and the work which has attracted the most attention, is in Research and Development. He created the Advanced Research Projects Agency, endorsed and pushed through supplemental funds—largely devoted to R&D funds and stepped William Holaday's guided missile office up a notch. Besides this, one of the most significant provisions in the Eisenhower reorganization plan was to elevate the Defense Department Research and Engineering office to a level above that of the other Assistant Secretaries. To function under a new director, the new R&D office, as planned by McElroy will have overall sway in all DOD research and development. The result will be to consolidate R&D authority and responsibility in a single office, with direct contact with the Secretary of Defense.

Relying heavily on Deputy Secretary Donald Quarles—on the basis of his past experience with R&D matters—McElroy has nonetheless taken the Defense scientific program as his own. And although Quarles "has assumed much of the load," research and development officials are quick to admit that McElroy "got a lot of things through that we wouldn't ordinarily get." Perhaps McElroy's attitude and activity towards the Defense research effort is best summed up by R&E's Laurin Knutson, Deputy to the Director of Review and Services: "We've been very well pleased under the McElroy regime."

Because much of McElroy's work has been done before Congress, it is fair to quote Sen. Richard Russell (D-Ga.), chairman of the Senate Armed Services Committee as to McElroy's work. After many years, both in Congress and on the committee, Russell's opinion is based on solid experience. Says Russell: "Mr McElroy is a man of unusual ability, and I admire the broad comprehension of Defense Operations that he has acquired in a relatively brief tenure . . . There is every indication that he will prove to be one of our most effective Secretaries of Defense."

It is this same confidence in Defense Secretary McElroy that is felt virtually throughout the Pentagon—and with this confidence behind him, it is most likely that Neil Holser McElroy can look forward to more years of the same success he has had during his first year as Secretary of Defense.

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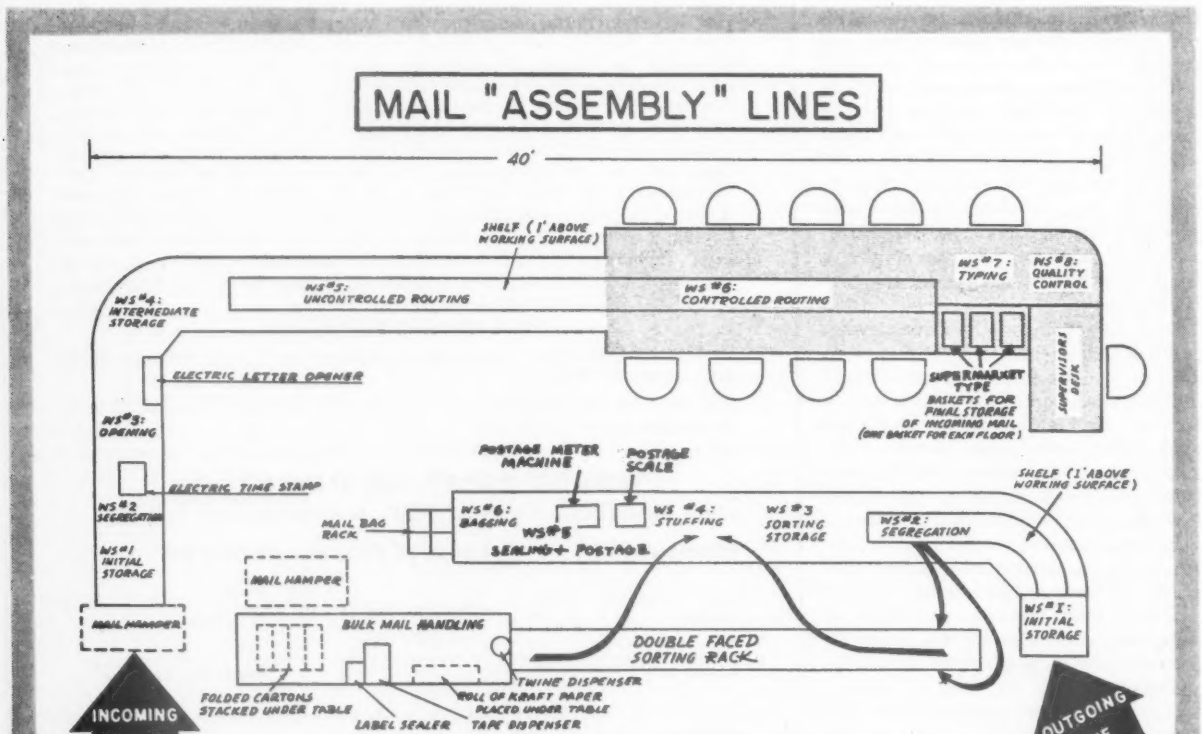
How a Navy Office Doubled Its Mail Handling Capacity

Sorting mail from both sides of the rack.

WHEN it's a two-day job to get a memo across the hall, it's time something was done about the mailing system. This situation, and this realization, occurred at Navy's General Stores Supply Office in Philadelphia, and the results are necessarily interesting to anyone who values efficiency.

Before GSSO began to overhaul their mailing system, their mailroom was handling 2500 pieces of mail a day, with an elapsed processing time of two days. Sixteen people with a combined yearly salary of nearly $50,000 worked with the mail. When the reorganization was completed, personnel savings alone were over $8,000 a year—nearly 20%. With an elapsed processing time of only one day, the mailroom, with a staff of 13, was handling 5,700 pieces daily. And personnel economies paid for the $5,000 cost of new equipment in just over six months.

Before the overhaul, the GSSO mailing system scarcely deserved to be called a system. The sixteen employees were broken into three sections, working virtually independent of each



Discussing a dispatch routing problem.

Assembly line sorting of outgoing mail.

other. The work area was poorly organized, and the equipment was inadequate for the job at hand.

On a difficult delivery, states a GSSO report, routers would drop all else and "indiscriminately" devote time to the single problem. In the words of the report, "the organization pattern had erected positive barriers against flexibility of mailroom personnel." While there had been an attempt to set up a routing guide, it was so ineffectual that routers had to fall back on their own knowledge and judgment—inconsistencies and errors were inevitable.

Inefficient time schedules created backlogs of incoming mail which would sit overnight in the mailroom, and outgoing mail was allowed to accumulate at its source. A bi-weekly report on overdue mail and replies had become so voluminous that it was a week after the fact.

The mailroom sorters' table was inadequate and poorly placed. Because it allowed only two sorters to work at one time, it was one of the first and most important replacements made.

The reorganization of the mail system took just one year to complete, and was carried out in five steps: (1) A preliminary analysis was made, to find out exactly where problems lay. (2) A reorganization plan was drawn up. (3) Using only makeshift equipment, the plan went immediately into practice. (4) When the results proved worthwhile, permanent equipment was installed to replace makeshift gear. (5) Finally, the new process was put into full operation, and is still being refined as needed. New ideas, during the overhaul, were put to work immediately, and as soon as they proved themselves, they were made permanent. They were rejected as quickly if they didn't pan out.

As a first step in the reorganization, one messenger was assigned to cover each of the three floors in the GSSO building. A system of high-speed electric dumb-waiters was installed to provide fastest possible inter-floor delivery. Next, and perhaps most important, was a system of sorting forward: provided with compartmented delivery carts rather than four-wheeled, flat-bottomed types, the messengers were told to sort as much of the mail as they could as they picked it up.

As a result, the sorting load in the mailroom was cut drastically. Internal mail was delivered without passing through the mailroom, and mail from one office to another farther along the messengers routes was delivered on the same run, greatly cutting elapsed distribution time.

A study of workload, said GSSO, showed a "specialization of labor which specifically contradicted and was incompatible with the workload pattern." Taken individually, the incoming and outgoing workload graphs offered hopeless patterns of peaks and valleys. But on the same chart, GSSO discovered that the loads fluctuated against each other—when incoming mail peaked, the outgoing mail was at a low ebb, and the reverse.

The workload study also showed that filing/clerical help, working on a standby/backlog basis, wasted many manhours. As a result, this section of the mailing system furnished a previously untapped manhour reserve which could be used to stopgap peak mail activity. Employee attitudes towards the new plan—in some cases open resistance—forced physical rearrangement of the mailroom, a much-needed step anyway. The result was an assembly line for handling the mail, with over-specialization essentially ended.

Incoming and outgoing mail were handled on separate lines, with the handling operations arranged end-to-end, in order of time. Work stations were stand-up operations, except for time-consuming, quality jobs. Open wire baskets were used at each station, both to aid in mail segregation, and to give immediate visual checkpoints for bottlenecks. Personnel movement from station to station was slashed to an absolute minimum, and double-faced sorting racks provided room for twice the previous number of workers. With employees working on both incoming and outgoing mail, and filling in on clerical work when needed, the overall mailroom capacity was actually doubled.

The finished system needed only a few refinements. Personnel were increased on slower operations. For the difficult routing items, which had formerly tied up the entire system, one reference clerk was created. The number of routers was upped from five to seven, and a routing list was formed, on the basis of clecklists from GSSO operating departments and past experience. These listings were placed on quick-selection card files, and are kept constantly up to date.

A work measurement quantity control system was installed, and the voluminous tardy mail report was replaced with daily mailroom/office personal contacts. The work shift was staggered, ending previous overnight delays in outgoing mail. Incoming mail now reaches its destination as early as possible in the morning.

Besides the obvious savings in time, work and cost, GSSO says mail system employees now have higher morale than ever before. Work is carried out with maximum efficiency, and the savings are great. And while mail is only a small part of the total operation, GSSO management has shown good planning and sound management, through which the entire General Stores Supply Office will gain.

This Month: Brig. Gen. A. W. Betts

Executive Assistant to the Director of Guided Missiles
Office of the Secretary of Defense

For a construction engineer who "backed into the missile business by way of warheads," Brig. Gen. Austin W. Betts has done a good bit of pace-setting. As Military Executive Assistant to the Director of Guided Missiles in the office of the Secretary of Defense the 46-year-old general is well on his way to the top of his field, and is already influencing the nation's most vital missile decisions.

If Gen. Betts "backed" into the missile business, it is safe to say that he just plain stumbled into research and development in the first place. In 1945, Gen. Betts was assigned to the Manhattan Engineer District with station at the Los Alamos Scientific Laboratory, heart of the country's atomic weapon effort. He had been assigned as a construction engineer, but soon after his arrival, a need arose to relieve the Director of problems relating to support of the technical personnel, and Gen. Betts was made Associate Director of the Los Alamos lab, under Dr. Norris Bradbury. It was here that Betts began his late-started education in the ways of science, or more properly, as a scientific administrator. Says Betts, "I am not a technician, have never been, and probably never will be."

One of his main duties was to act as secretary to a directing board of scientists, and here, of necessity, and with gratefully acknowledged help from Dr. Bradbury, he learned the lingo and thought of scientists.

Later assignments for Gen. Betts were generally in the same line. He was Chief of Army R&D's Atomic Energy Branch, and later, Executive Assistant to Maj. Gen. K. D. Nichols, who was Army's chief of Research and Development at the time. At the end of this tour, he was sent to U.S. Army Headquarters in Europe as chief of the Combat Development Branch. In early 1956, Betts was recalled to this country to aid in construction work on the just-formed Army Ballistic Missile Agency in Huntsville, Ala.

The ABMA work lasted just six weeks, and was the second shortest tour of duty in Gen. Betts' career. (The shortest, five weeks, was the Master of the Sword at West Point in 1938. Betts was 1934 Eastern Intercollegiate high-bar and all-around gymnastics champion, and he had gone back to the Academy to instruct physical education and practice for the 1940 Olympics. The tour was cut short when the 1938 New England hurricane and floods created a desperate need for engineers to build flood control works to prevent recurrence of the kind of damage New England suffered in that storm.)

After the brief stay at Huntsville, Betts was called to the Pentagon as Army advisor to the brand-new Special Assistant for Guided Missiles, Mr. E. V. Murphree. In August of 1957, he took over his present job, and was promoted to Brigadier General in September of that year.

In spite of his relatively brief experience with missile weapon sys-

tems, the slim, soft-spoken general's job is probably one of the most complex and difficult in the Defense Department—William Holaday's Guided Missile office must make final major program decisions on all Defense Department guided missiles. Gen. Betts puts it this way: "Somebody must sit at the top and say yes or no. Funds must be adjusted from one program in relation to another in order to strike a balance in our defense program."

In the recent decision to begin work on the Air Force Minuteman family of solid propellent missiles, there is an example of the work done by the Defense Secretary's Director of Guided Missiles. The immediate and most important was whether or not to give the project a go-ahead. Next, Holaday's office had to decide how many of the weapons would be built, and how much time should be allowed to get them into the Air Force inventory.

In the time decision, the alternatives are an early or late approach. If the weapon is needed immediately, planners must rely wholly on the present state-of-the-art. If the need for numbers is not as urgent from the time standpoint, DOD can afford to wait for, or specify, further refinements in the system before authorizing production.

There are many other questions answered by the Guided Missile office. They must decide, in the Minuteman project, the type of propulsion system, whether to use liquid or solid propellants. They must designate, with the aid of Atomic Energy Commission, the type of warhead it will carry. They also will have to ascertain whether minuteman can be produced with present industrial facilities, and they will decide the number of missiles that will be given over to further development, training and actual deployment.

With a staff of only 20 professional people, this job looks virtually impossible, but the Guided Missile Office relies heavily on outside aid. While Gen. Betts says "the best source of the things we need to know is the contractors," the many offices in DOD also contribute to the information needed for the missile decisions. The Joint Chiefs of Staff, the Services, Atomic Energy Commission, the Weapons Systems Evaluation Group, Assistant Secretary for Research and Engineering and others, including the Assistant Defense Secretary for Supply and Logistics, all aid in the final decision that is handed down by Missile Chief Holaday.

The means of coordinating information is the committee system, and Gen. Betts has a strong argument for the continuation of this method of operating: "If this were abolished today, in one year's time this whole damn thing would be chaos. No one little team can know everything about everything in the guided missile field, and frankly, I don't know of any other mechanism for getting our job done quickly. What and how much is enough with missiles is tremendously complex. Working with other offices is the only thing that permits us to survive."

Gen. Betts points out that the best opinion on a given project must originate with someone who has worked with it on the operating level. It is impossible for anyone but a solid propellant expert to offer expert advice on solid propellants. As soon as a project scientist is pulled into DOD to direct overall policy, he loses touch with projects in the field. It would be most uneconomical, Gen. Betts continues, to maintain the staff necessary to advise the guided missile office on all of the technical decisions it must make. On the other hand, it would reduce decision-making to a "rubber stamp" process if the job were attempted with less than the present amount of advice and professional knowledge.

It is in Gen. Betts' office, as much as any other in DOD, where the much-publicized interservice missile rivalry is focused. Faced with resulting problems almost daily, Gen. Betts defines it as "just salesmanship. Each Service is unquestionably enthusiastic about its own programs, and each Service looks at a problem in terms of land, sea or air. But you no longer have land, sea and air in convenient packages . . . We would fall flat on our faces if we tried arbitrarily to end this salesmanship, because we cannot afford to freeze out ideas."

On three walls of Gen. Bett's office, there are photographs of just three air defense missiles—Nike, Bomarc and Talos, representing each of the Services. On his desk, Gen. Betts has only one model. It is an experimental missile which was never built. While this may be impartially on a fine point, there can be no doubt that the general maintains this same impartiality on the major issues in his work: "The military people on this staff are not party-liners. This is most important."

Having worked with scientists for thirteen years, Gen. Betts has unquestionably been influenced by their thinking. Their outlook, as he sees it, is this. "They are just like anybody else, except they tend to be a little more intelligent and to have a greater curiosity than most people. They have no patience with stupidity. No matter how hard it is for them to accept a decision, I've found that they are willing to abide by it if it has a logical basis. The arbitrary decisions are the ones that cause trouble."

It is along these lines that Gen. Betts has done his job, and the results speak for themselves. It is equally certain that in the future the decisions will be as intelligent and non-arbitrary as they have been in the past, and that the result will be the sound missile program that our country must have.

Run Down of Key Contracts

ADVANCED RESEARCH PROJECTS AGENCY

$1 million to **General Atomic Div., General Dynamics Corp.** for feasibility study of controlled nuclear explosions in space propulsion.

ARMY

$1.6 million to **The Symington Wayne Corp.** for hydraulic launching equipment for the Nike-Hercules missile.

$4.6 million to **Douglas Aircraft Corp.** for the Nike-Hercules program.

$2.6 million to **International Business Machines Corp.** for automatic data processing equipment.

$1.3 million to **Republic Aviation Corp.** for short range surveillance drone engines.

$30 million to **Hughes Aircraft Co.** for production of elements of the Missile Monitor air defense system.

$1.2 million to **National Company, Inc.** for tropisheric UHF-power amplifiers.

$1 million to **Ryan Aeronautical Co.** (by letter of intent) for production of RANAV integrated automatic navigator and flight control systems.

$1.8 million to **ALCO Products, Inc.** for Honest John jet assist take off motors.

$1.9 million to **Chrysler Corp.** for the Jupiter intermediate missile program.

NAVY

$1 million to **General Electric Co.** for constant speed drives for A4D aircraft.

$2.4 million to **The Martin Co.** for work on the Bullpup air-to-surface missile.

AIR FORCE

$3 million to **Sylvania Electric Products, Inc.** for production of all-weather radar navigation systems.

$1.7 million to **Bendix Aviation Corp.** for development and production of a warhead proximity fuse for the Bomarc air defense missile.

$4 million to **Wright Aeronautical Div., Curtiss-Wright Corp.** for overhaul of 352 J65 aircraft engines.

$4 million to **Southern Airways Co.** for operation of primary pilot training schools during fiscal 1959.

$4.5 million to **Garner Aviation Service Corp.** for operation of primary pilot training schools in fiscal 1959.

$4.2 million to **Pittsburgh Institute of Aeronautics** for operation of primary pilot training schools in fiscal 1959.

$3.5 million to **Anderson Air Activities** for operation of primary pilot training schools in fiscal 1959.

$3.8 million to **California Eastern Aviation** for operation of primary pilot training schools in fiscal 1959.

$3.9 million to **Hawthorne Flying Service** for operation of primary pilot training schools in fiscal 1959.

$1.1 million to **Vertol Aircraft Corp.** for production of all-metal rotor blades for the H-21B helicopter.

$10 million to **National Northern Corp.** for maintenance and operation of the Distant Early Warning line in fiscal 1959.

$29.7 million to **Systems Development Corp.** for air defense systems training in conjunction with SAGE.

$1.9 million to **Massachusetts Institute of Technology,** to be subcontracted to **The Mitre Corp.** for air defense system integration work.

$1.5 million to **General Electric Co.** for overhaul of J79 engines.

$3 million to **Eastman Kodak Co.** in four contracts from all services. Work will be done on Navy A3J bombsights, B-52 fire control systems, fuzing for Navy's Sidewinder missile and a safety and arming mechanism for Army's Hawk missile.

$5 million to **General Electric's Light Military Electronics Dept.** for forward surveillance radar to be used with the B-52. Overall contract may exceed $14 million.

$2.5 million to **International Business Machines Corp's Military Products Div.** for long lead-time items in connection with the B-52B program.

$1.5 million to **Uinell Co., Inc.** for maintenance and operation of the SAGE utilities systems.

$3.8 million to **Lockheed Aircraft Service-International** for maintenance, overhaul and modification of Military Air Transport Service aircraft and helicopters.

New DOD School Formed To Train MAP Officers

Defense Department has officially opened the Military Assistance Institute, a school for officers who are to be assigned to foreign countries in connection with the Military Assistance Program.

Purpose of the school, located just outside of Washington, D.C., is to provide an effective means of instructing military personnel in the aims, missions and role of the U.S. Government involving the Military Assistance Program.

DOD anticipates that approximately 100 officers will attend each of a planned 10-12 classes a year. Each class will run for four weeks.

Management Education Stepped up by Army

Army has reported that its management improvement/work simplification program has been greatly intensified in the past few years.

During one year, Department of the Army says, upwards of 10,000 officers and civilians were graduated from management courses. These include courses varying from Infantry School to the 14-month Comptroller Course at Syracuse University.

"During the same period," Army reported, "20,000 supervisors were trained in management engineering techniques."

AMC Reorganization Will Split Staff, Operations

Air Materiel Command's Directorate of Procurement and Production will undergo a physical reorganization which will separate staff elements from those elements dealing with day-to-day problems on an operational level. The move will take place over the next six months.

ARMED FORCES MANAGEMENT will publish a full rundown of the organizational overhaul and its implications in November. In announcing the move, AMC Commander Gen. E. W. Rawlings stated that "The objective of the relocation is to separate world-wide staff surveillance of procurement and production functions from the implementation of weapon systems concept and central buying functions."

The change will involve moving key directorate staff elements to the AMC Headquarters Building, while such offices as the Weapons System Project Offices will remain at their present Wright Field location.

At the same time the Procurement and Production reorganization takes place, the AF Ballistic Missiles Office in California will be placed organizationally director under the Commander, Air Material Command, with direct access to that office.

Moving to new offices will be the Director and Deputies for Procurement and Production, including Production Management, Production Planning and Production Engineering Divisions. Target date for completion is 15 Jan. 1959.

AF Logistics School Gives Negotiation Class

Techniques for Negotiation Conferences will be the first course offered in the recently formed Air Force Institute of Technology's School of Logistics. The school will include twelve courses in a procurement and production professional education program.

While the first class in the school is limited to members of Air Materiel Command's Directorate of Procurement and Production, in the future it will be open to "other Air Force and military personnel as well as personnel from other agencies of the government." Principal teaching devices will be guest lecturers, case histories and practical negotiations. The courses will be run one at a time, and when complete, the school will accommodate 225 students at a time, for a yearly total of 2100. School staff will number 45, under Col. Eugene R. Magruder, Dean of the school.

Top Air Force pilots undergo briefing on the supersonic F-105 at Republic Aviation's Farmingdale, N.Y. plant. These men will form cadre for F-105 integration.

Other classes planned for the school include Essentials of Price, Cost and Profit Analysis and Shop Theory and Practice. The latter of these has already begun at North American Aviation's Los Angeles, Calif. plant, and is one of three production classes which will be offered. The other nine classes in the school will be devoted to procurement.

In the negotiations course, the teaching approach will be from the standpoints of human relations, and from techniques of negotiations as such. The first of these deals with setting up good contractor relations, and the second will treat preparations, positions and issues, strategy and argumentation.

AMC Officials Get Management Awards

Five high-ranking Air Materiel Command officials were honored for their management skills at the Sept. 27 Air Force Association convention in Dallas, Tex. Receiving awards were Maj. Gen. Frederick Dau, Roy Van Horn, Col. Joe P. Walters, Col. Richard Dyer and Col. Douglas R. Brown.

Top award of the five went to Gen. Dau for his concept of placing emphasis on the most important, essential and costly aspects of management in the Hi-Valu Lo-Valu program. This program, says the citation, saved "millions of dollars" for the Air Force, and won Gen. Dau "Air Force-wide acclaim."

Col. Brown received the General Management Award for his outstanding managerial ability in the management of the petroleum program. Col. Walters was honored with the Procurement and Production Management Award for his work with Air Force procurement, production and installation of high priority electronic systems.

Van Horn was given the Maintenance Management Award as a result of his revision of directives and procedures for the maintenance of aircraft and their component parts. Supply Management Award went to Col. Dyer for his immediate action in applying the new weapon system support manager concept to the F-100 and F-104 aircraft. Work was done in connection with the Military Assistance Program.

Dates to Circle

October 13-15
International Systems Meeting, Systems and Procedures Assoc.—Pittsburgh, Pa.

October 16-18
The Institute of Management Sciences Annual Meeting—Philadelphia, Pa.

October 20-21
Remington Rand Univac Users Conference—Boston, Mass.; hosted by John Hancock Mutual Life Insurance Co.

October 20-22
Annual Meeting, Association of the U.S. Army—Sheraton-Park Hotel, Wash., D.C.

October 23-24
Second National Convention, American Society of Military Comptrollers —GSA Auditorium, Wash., D.C.

October 27-28
Fifth Annual East Coast Conference, Aeronautical and Navigational Electronics—Lord Baltimore Hotel, Baltimore, Md.

October 27-31
American Society for Metals, 1958 National Metal Exposition and Congress—Cleveland.

October 29-30
Fifth Annual Computer Applications Symposium, Armour Research Foundation—Chicago, Ill.

October 30-31
Fourth Electronic Business Systems Conference—Seattle, Wash.; sponsored by Western Division of NMAA.

October 30-31
IRE, 1958 Electron Devices Meeting, Shoreham Hotel, Washington, D.C.

November 4-5
Second Annual Executive Techniques for Industrial Engineering seminar—Hotel Sherman, Chicago; sponsored by the Industrial Management Society.

November 5-7
22nd Annual Industrial Engineering and Management Clinic—Hotel Sherman, Chicago; sponsored by the Industrial Management Society.

November 17-18
Sixth Annual Aircraft and Missile Division Conference, American Society for Quality Control—Dayton, Ohio.

Shift in Key Personnel

ARMY

Brig. Gen. Marshall Stubbs, Commanding General 1st Logistical Command, to Army Chief Chemical Officer.

Lt. Gen. Guy S. Meloy, Deputy Commander of Fourth U.S. Army, to Commanding General, 4th Army.

Brig. Gen. Frederick O. Hartel, U.S. Eighth Army, Korea, to Office of Assistant Secretary of Defense for International Security Affairs.

Maj. Gen. Richard C. Partridge, Chief, Joint U.S. Military Assistance Group, Thailand, to Headquarters, 1st U.S. Army in November.

Brig. Gen. Kenneth A. McCrimmon, Assistant Chief of Army Engineers for Troop Operations, to 1st Logistical Command.

Maj. Gen. Robert B. Butler, Deputy Commanding General, Army Communications Zone, Europe, to Picatinny Arsenal.

Brig. Gen. William J. Ely, Deputy Director, Logistics Headquarters, U.S. European Command, to Office of the Chief of Research and Development, in Feb. 1959.

NAVY

RAdm. Glynn R. Donaho, Commander, Destroyer Flotilla Three, to Director, Logistics Plans Div., Office of Chief of Naval Operations.

Capt. Forsyth Massey, (RAdm. selectee) from Bureau of Naval Personnel, to Director, Aviation Plans Div., Office of the Chief of Naval Operations.

Capt. Frank B. Miller (RAdm. selectee) Office of the Chief of Naval Operations to Assistant Chief of Naval Operations, General Planning.

Capt. Alonzo B. Gratham, Jr. (RAdm. selectee), Assistant Chief of Staff for Operations, Staff, Commander in Chief, Naval Forces, Eastern Atlantic and Mediterranean, to Deputy Chief of Staff for Operations and Plans, Staff, Commander in Chief, Naval Forces, Eastern Atlantic and Mediterranean, and Staff, Commander in Chief, Specified Command, Middle East.

RAdm. Ira H. Nunn, Commander Service Force, Atlantic Fleet, to Senior Member, United Nations Command, Military Armistice Commission, Seoul.

RAdm. Edward J. O'Donnell, Commander, Destroyer Flotilla Six, to Deputy Director of Naval Intelligence, Office of the Chief of Naval Operations.

RAdm. Allen Smith, Jr., Commander Naval Aviation Safety Center, Naval Air Station, Norfolk, Va., to Chief of Naval Air Reserve Training.

RAdm. Alexander S. Heyward, Jr., Office of Chief of Naval Operations to Director, Politico-Military Policy Div., Office of the Chief of Naval Operations.

Capt. William S. Post, Jr. (RAdm. selectee) Assistant Chief of Naval Personnel for Performance, to Director, Far East Region, Office of the Assistant Secretary of Defense for International Security Affairs.

RAdm. Frank O'Beirne, Commander, Carrier Division Three, to Office of the Chief of Naval Operations.

RAdm. Elton W. Grenfell, Commander, Submarine Force, U.S. Pacific Fleet, to Assistant Chief of Naval Operations (Logistics) in Jan. 1959.

RAdm. Vernon L. Lowrance, Deputy Director of Naval Intelligence, to Commander, Cruiser Division Three.

RAdm. Thomas Burrowes, Director, Logistic Plans Div., Office of the Chief of Naval Operations, to Commander, Service Force, Atlantic Fleet, this month.

AIR FORCE

Brig. Gen. Glynne M. Jones, 1141st USAF Special Activities Squadron, to SHAPE, 5th Allied Tactical Air Force.

Brig. Gen. Joseph R. Holzapple, Chief of Operations Control Div., Director of Operations, is now also Assistant Chief of Staff for the Air Defense System.

Brig. Gen. Ernest H. Beverly, Headquarters, 9th Air Div., Air Defense Command, to Headquarters, Washington Air Defense Sector.

MARINE CORPS

Brig. Gen. Lewis J. Fields, staff of the Vice Chief of Naval Operations to Joint Staff, Office, Joint Chiefs of Staff.

Brig. Gen. Henry W. Buse, staff of the Commanding General, Fleet Marine Force, Atlantic, to staff of the Vice Chief of Naval Operations.

How Air Force Quality Control Works

A solid foundation established in its formative years has enabled the Air Force Quality Control Program to prepare for today's problems.

by Colonel C. A. Peterson,
Former Chief, AMC Quality Control Office

WHEN the Air Force was established in 1947 it seemed an ideal time for the re-evaluation of the entire system of Government inspection.

Prior to that time, as a part of the Army, the Air Force's procurement and inspection activities had paralleled those of such technical services as the Signal Corps and the Ordnance Corps. Suddenly, however, the newly created U.S. Air Force found these procurement and inspection functions greatly expanded, equivalent in scope to those of the Army or the Purchasing Bureaus of the Navy. Except where supply items common to all the services were involved, the Air Force was now definitely on its own.

During World War II the Air Force had experimented with the concept of "surveillance inspection," although at that time its principles were ill-defined and the subject of much criticism from all quarters. The Air Force reorganization occurred within a period of low procurement activity and provided the right opportunity for careful consideration of every aspect of the inspection problem.

When considerable study and research led each time to one conclusion, it was inevitable that some form of surveillance was the only means that could possibly enable the Air Force to meet requirements within the limitations of peacetime budgets and at the same time enable it to provide the organization required to put such a program into effect.

One of the major problems, incidentally, was reorienting the thinking of Air Force personnel.

The separation of inspection from the procurement function was one of the first changes made in 1947, when an Inspection Division was established at Headquarters, Air Materiel Command. Shortly after that, when its functions transcended mere inspection, the organization was redesignated as "Quality Control." The adoption of this new name did not imply that it was the intention of the Air Force to control quality in the usual sense of the word; on the contrary, the Air Force recognized that any kind of "surveillance inspection" would be ineffective without proper control, by each contractor, of his *own* quality.

At about this same time the Air Force realized the need for greater utilization of statistical techniques in the field of quality control, and assigned to the new organization a Statistical Quality Control Officer. Since that time Statistical Quality Control has become an area of increasing interest and activity.

In 1949 the Stanford Research Institute prepared for the Air Force a comprehensive review of its inspection function during World War II, and proposed many recommendations for improvement. This review augmented the Air Force's own studies, and helped to accelerate the reorientation of the Air Force point of view.

Through a continuing series of improvements, the Air Force now has in effect its new Specification MIL-Q5923C.

Let's trace some of the basic steps in the development of the present Air Force policy that have led to the new "Air Force Quality Assurance Program."

First of all, the new policy recognizes the unique position of the Government as a consumer, a position dictated by the fact that payment for the materiel it buys is provided by public funds. Then there is the further responsibility of the Government to treat all its suppliers in an equitable fashion. Each citizen has a right, in open competition, to do business with the Government, and has the further

right to have his product impartially judged for conformance to specification requirements. Furthermore, all Americans have the right to expect that the Government will get full value for the money it spends.

For these various reasons, it is absolutely necessary that the Government either inspect or supervise the inspection of everything it buys. This is clearly spelled out in the Armed Services Procurement Regulations, and has the force of law. Government inspection, therefore, is a legal requirement.

It not only provides protection to all citizens, both as taxpayers and as competitors for Government business, but it is intended also to provide guarantees that both in quality and in quantity, the Government will get an adequate return for every dollar it spends.

Today's Air Force Quality Assurance Program, with its fundamental policy of "surveillance inspection," is based on the fact that the Government cannot buy the equipment it needs on a *caveat emptor* basis. This is sound reasoning—practical, economic and psychological.

In most cases, Industry is given the responsibility for designing and manufacturing Air Force equipment, and so it is only logical that Industry should also be given the responsibility for controlling the quality of this equipment. And instead of placing in the contractor's plant a huge force of Government inspectors, it is far more logical and practical for the Air Force to require that the contractor inspect and test his own product, and then furnish to the Air Force objective evidence that the product meets all specified requirements. Such evidence, evaluated and verified by Government product inspection, then forms the basis of *acceptance* of the product. Surveillance inspection, as it is now performed by the Air Force, makes this procedure entirely possible.

It is significant that 3800 Air Force procurement inspectors performing surveillance inspection are today handling a greater workload than the 14,000 inspectors on the Air Force payroll at the peak of World War II—before the concept of surveillance had been developed into an operational program.

To enable the quality control concept to function, however, it is absolutely essential that the control of quality stem from the contractor and not from the Government. In no other way would it be possible for the Air Force to obtain compliance with one of its basic principles—that quality cannot be *inspected* into a product, *it must be built in.*

Today, Industry's recognition of the vital importance of this basic Air Force concept is convincingly reflected in the steadily increasing dependence now being placed by Industry upon all phases of quality control. As a typical example, one noted industrial advocate of quality control recently made this emphatic statement: "The growth of quality control has been one of the major forward steps that industrial practice has taken in our economy during the past decade or more." In fact, Industry as a whole has recognized that control of quality is a part of management and is essential to its success in meeting competition.

Quality Control's initial concept of the fundamental responsibility of the contractor for *building quality into a product* is today acknowledged as being of basic importance—now that Industry itself is showing increased interest in possible applications of quality control principles to its management problems.

The active interest taken in quality control by Industry and the Air Force eventually led to the present-day establishment of quality control training courses in leading educational institutions from coast to coast. Both staff and field quality control personnel of the Air Force actively participate in meetings held by Industry to consider further improvements in training.

Quality Control's continuing emphasis upon the necessity of making both its own Air Force personnel and the contractor's production workers "quality conscious" eventually led to the production of its new film, "Quality Control." Shown for the first time in May 1956 at the ASQC National Convention in Montreal, this film was conceded to have been "one of the highlights" of that important convention. The film has subsequently been shown to other groups, and viewed by top-ranking officials, executives and technicians from various sections of Industry.

Air Force contractors were particularly interested in the film because of its timely and effective presentation of the many highly important factors governing the reliability of complex Air Force equipment. They were quick to recognize its unique value for further intensive training of their production workers; and as the film is available on a loan basis, it has been in constant demand ever since.

(Incidentally, when two army colonels from the Japanese Defense Agency visited the Quality Control Office at Hq AMC recently, they were so impressed with the film's possibilities for personnel training that they took a copy with them and dubbed in the sound track in Japanese.)

Another of the projects initiated by Quality Control that has recently developed into spectacularly successful application by Industry was the establishment of a Statistical Sampling Plan for the partial elimination of tear-down after initial (green) run for aircraft engines.

This plan may be applied to all types of aircraft engines including reciprocating, turbojet, turboprop, and rocket; to helicopter transmissions or other equipment requiring tear-down after initial run.

Far surpassing the original expectations of the Air Force, the use of these plans has resulted in greater quality assurance and greater economy in the control of complex and expensive equipment. Savings have already reached an estimated total of several million dollars.

Another important quality control program is the Precision Measurement Equipment Calibration Program. This is intended to assure that all mechanical and electrical testing devices will meet Air Force standards.

The rapid advancement in electronic technology in the past few years and the subsequent introduction of complicated electronic systems in operational and support equipment has greatly increased the accuracy requirements of functional units. These accuracy requirements can be maintained only through a well-integrated calibration program for precision measurement equipment.

At the present time the center of activity in the development of this system is the Dayton Air Force Depot.

By early January 1958 transfer of electrical and electronic measurement standards to the Boulder Laboratories of the National Bureau of Standards in Boulder, Colorado, was nearly complete. The Dayton Air Force Depot will assign personnel to the Boulder Laboratories to provide electrical and electronic measurement calibration service direct from the National Bureau of Standards to the Air Materiel Areas and to the Air Force Depots.

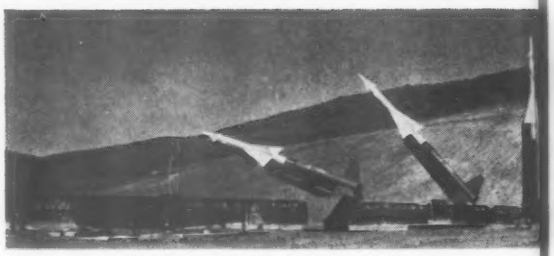
This establishment of the Air Force standards activity is expected to provide an efficient and economical calibration service of electrical, electronic and dimensional test equipment utilized in maintenance engineering organizations.

This very brief review of the basic facts covering Quality Control's background may seem beside the point today in considering all the grave problems now confronting Industry and Government. But it is precisely because of the solid foundation established in these past few formative years that Quality Control can, in its new Air Force Quality Control Assurance Program, cope with the vital problems of today.

Why Missiles are Everyone's Business

Author Medaris

Jupiter IRBM in successful flight test.



Nike missiles, launchers guard sky.

by Maj. Gen. J. B. Medaris
Commanding General
Army Ordnance Missile Command

MISSILES are everyone's business! That's no exaggeration—every citizen has a stake in the missile programs aggressively carried forward by the Army.

Looking at the situation from my vantage point, as the systems manager responsible for 15 major weapon systems and several outer space projects, I know that we buy research, components, assemblies or complete systems in every State. We manage the defense dollars of millions of taxpayers. In return, we provide weapons to guarantee the security of their homes and families.

We buy what we need where it exists. Consequently, a large percentage of our money goes to industrial contractors in North Carolina, California, New York and Michigan. They, in turn, "farm out" procurement of parts, components and assemblies to sub-contractors across the nation.

We use the reservoir of knowledge in educational and research institutions. For example, the Army Ballistic Missile Agency, a key facility in my Command, has in two years placed 40 contracts for research and experimental work in more than 20 different educational institutions. They involve expenditures of $17,200,000.

These contracts pay for investigative work in such areas as the analysis of missile tracking accuracy, climatological observation, telemetering and measuring, vibrational behavior of missiles, aerodynamic damping principles, determination of electron densities of the ionosphere, liquid motion, effect of meteors upon missiles outside earth's atmosphere, aerodynamic heat studies, and development of a missile defect reporting system.

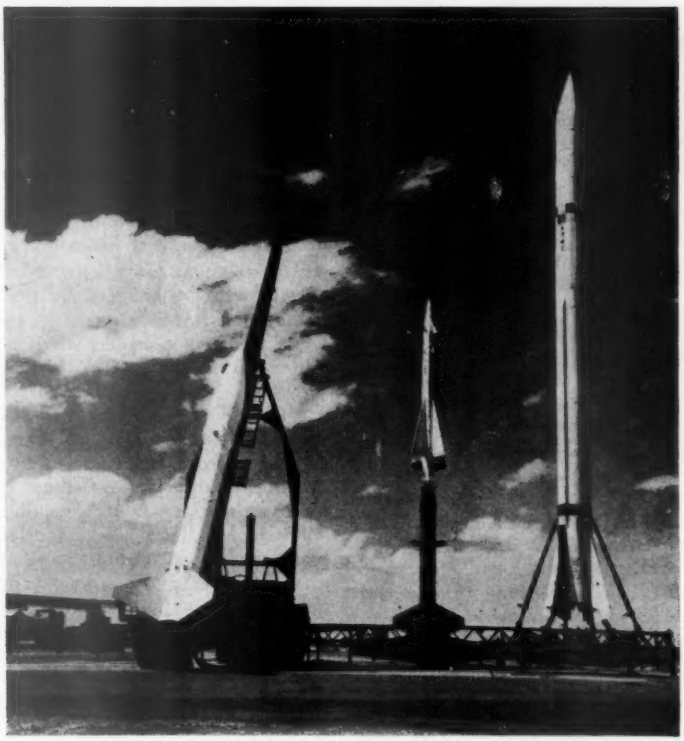
A bulwark of Army research effort in missiles is the Jet Propulsion Laboratory of California Institute of Technology, another element of my Command. It contributed to the development of a number of Army weapons systems, performed all the development engineering on the CORPORAL and its eventual successor, the SERGEANT, and has played a pioneering role in missile progress.

Its primary task is to conduct supporting research today to advance the state of the art, and furnish information useful to us tomorrow in developing even better missile systems. The more than 2,000 scientists, engineers and technicians of the Laboratory represent a tremendous creative potential.

We buy applied research. This is intended to advance the state of the art in selected technical areas. Many of the 1,574 procurement actions of less than $100,000 each which were initiated between July 1, 1956 and January 31, 1958 represented applied research tasks. Small businesses; those employing fewer than 500, do much of this work.

We receive active support from other installations and facilities of the Defense Department. The long-range Army-developed missiles, REDSTONE, JUPITER, and JUPITER C, are launched from the Missile Test Center, Cape Canaveral, Fla., operated by the Air Force. The integrated range at White Sands Proving Ground, N. M., managed by the Army, and also part of my Command, is used extensively.

The Navy's Bureau of Ordnance performed aerodynamic research studies for the JUPITER IRBM system, sled tests and gyro tests for guidance systems. The Navy's Training Devices Center developed the Redstone Missile fire unit proficiency analyzer for the



First family of big U.S. Missiles—Honest John, Nike, Corporal.

Army's largest weapon recently turned over to the combat arms for overseas deployment.

In the Army itself, the Signal Corps, Corps of Engineers, Chemical Corps, Transportation and Quartermaster Corps directly support our programs.

Ordnance Corps arsenals and commands provide specialized know-how not available elsewhere. Among them are Detroit Arsenal, Diamond Ordnance Fuze Laboratories, Frankford Arsenal, the Ordnance Weapons Command, the Ordnance Guided Missile School, the Ordnance Tank Automotive Command, Picatinny Arsenal, Rock Island and Watertown Arsenals. Fourteen Ordnance Districts administer our contracts.

We make full use of such installations when the Government's best interest requires it. The specialized capabilities of these Government Agencies are seldom in competition with industry, but provide unique resources for the rapid solution of difficult problems.

From 83 to 95 percent of all Army missile funds go to private industry, the percentage varying from system to system.

For development requiring the evolution of new and improved material, we select high grade, progressive industries with production capability for the larger and more complicated components of missile systems. They later become the major sub-contractors to a systems contractor, or themselves take over missile systems as prime contractors.

When a prime contractor assumes production responsibility, engineering changes frequently enter the picture in the early stages. These are unavoidable because defects, found only after flight testing, must be cured; performance and reliability must be improved; compatibility between components must be assured; safety must be guaranteed; and the entire system must be maintainable on a reasonable basis.

The intensity of the effort to achieve and maintain weapons superiority constantly advances the art. This impels design changes to provide troops with the most advanced and superior material.

When stability has been achieved and fabrication of tactical missiles begins, subsequent engineering changes are introduced through a "block" system and are limited to missiles which will be produced within a definite time period. The systems contractor assembles the entire missile and monitors every change to insure compatibility.

The same criteria apply to ground support equipment which contains electrical, hydraulic, mechanical and electronic components so interrelated with the missile that compatibility becomes an overriding consideration. Some ground equipment items are less complex;—such as fuel transporters, erection equipment, and missile transporters. Generators and liquid oxygen plants come from the Corps of Engineers, nuclear warhead adaption kits from Picatinny Arsenal, transport type vehicles from the Tank Automotive Center.

To protect the Government's interest and insure quality and timeliness in the performance of sub-contractor complex, we require the prime contractor to furnish his plans for the use of small business concerns and price analysis procedures, and to obtain competitive proposals. The Ordnance Districts monitor this phase, and check all fixed price subcontracts in excess of $25,000 and all subcontracts for facilities and special tooling in excess of $1,000.

When we procure standard or semi-standard items, contractors are selected for bid solicitation. My Agencies and all 14 Ordnance Districts maintain bidders' lists and source files, cross indexed by product or service. The files are separated by specific items, such as electronics, ballistic shells, spin motors, JATOs and ground support equipment.

The files contain full information on the company, number of its plants, their location, square feet of floor space in each, subsidiary companies, type and location of industrial facilities, past experience in missile work, capability in quantity and quality of manpower available.

We buy in each case as the circumstances require: by negotiation, formal advertising, cost-reimbursement, fixed price, time and material type contracting, "call" and open-end contracts.

Among the present major contractors to the Army missile effort are:

Western Electric Co., Chrysler Corporation, Douglas Aircraft Co., North American Aviation, Ford Instrument Division of Sperry Rand, Curtiss-Wright, Goodyear, Firestone, Gilfillan, Raytheon, The Martin Company, Reynolds Metals, Radioplane, Okinite, Eastman Kodak, Alco Products and American Bridge Co.

In the fiscal year which began July 1, 1958, my Command will be responsible for the intelligent handling of nearly $2 billion in tax money. We are determined to manage it wisely, and assure maximum results for every dollar entrusted to us.

Streamlining Methods of Technical Writing*

Eighth In A Series

by Roswell Ward

Technical Publication Management Consultant

In too many organizations where technical publication departments are operating there is a tendency to regard the writing staff (a term which for the purposes of this article also includes editors and publication section leaders and managers) as engineers only and, for all practical purposes, to forget that they are writers. The reasons for this situation seem to be as follows:

1. There are relatively few recognized professional standards for the training, qualification, and certification of factual writers. Organizations, more and more, want a precise educational-professional label and many technical writers don't easily fit into that kind of standardization.

2. There is limited published literature on the management of writers so that both the human relations aspect of "writer management" and the methods of providing efficient working facilities are virtually unknown, even in newspaper, public relations, and advertising circles.

3. There is a tendency to think that the clumsy and time-consuming methods used by most engineers in writing reports are suitable for technical information personnel; or that facility in the everyday work of written inter-office communication—letters, memos, field reports, etc.—may indicate a professional level of writing facility suitable for a technical writer. Good technical writing requires aptitudes, experience, and special facilities as different from routine "communication writing" as a good college professor's teaching is different from the informative procedures of a train announcer.

4. Many executives regard writers, taken en mass, without the reassuring title "engineer" hook-on somewhere, with suspicion.

5. As outlined in the last article of this series (ARMED FORCES MANAGEMENT, September, 1958) there has not been a development in technical information management along the same lines as has appeared in the management of research and development activities.

The present disregard for adequate writer management is the most serious obstacle which faces the development of better technical writing in industry, government, education, research, and the armed forces. A parallel case in point is the lag in the development of Ground Support Equipment for the missile program. You can't have a good missile program without equal talent and priority being devoted to GSE. You can't have any effective program for training and maintainence of combat readiness of military hardware without a constant development of new and better instruction books and operating, overhaul and repair, and parts manuals and the methods of planning and producing them.

Executives in many organizations have recently told me: (1) A typewriter at the desk makes a man's duties look routine or semi-clerical in nature. (2) Transcribing manuscript should be done by clerk typists or stenographers and not "waste the writer's time" (3) Clerical personnel resent writers doing their own typing! None of these absurd ideas have ever appeared in newspaper, business publishing, or technical book publishing—to some degree, the real pioneers in writer management!

Cost studies (the publication of which will be announced); studies of comparative quality of writing, writer morale, and percentage of turnover in technical writing personnel (which has increased in some organizations) show that use of typewriters has many advantages, only a few of which can be summarized in this article.

Much good writing is also done by dictation, including first draft technical writing. However many an organization will let an order clerk dictate, to a secretary or a machine, and refuse to permit dictation facilities to technical writers. More and more recordings of various types are being used in every conceivable activity.

However the typical management "sound barrier" has thrown a road block across all but a small percentage of technical information activities. Secretaries who can take technical dictation or dictating machines, plus typists who can transcribe from them, "cost money," as many executives point out. However the writer's own experience, plus that of several manufacturers, shows conclusively that time and money actually can be saved.

One important point in this connection is that with the traditional paper and pencil writing, a considerable number of false starts and trial and error writing can be done—the costly time and effort involved in this "confusion on paper" being a secret between the pencil-and-paper writer, his conscience, and his waste basket.

An expedient often used by experienced "writer managers" is the posting of forthcoming writing projects with an arrangement whereby the writers can ask for assignments to subjects which interest them.

A procedure which is useful for many types of writers and which may greatly improve the volume of output and the quality of work done is *flexibility in working hours:* "coming later and staying later" is important to many writers and editors, just as it is to research and development personnel, and evaluation of work done is based on getting a good job done in a reasonable length of time, rather than rigid adherence to a time clock. Most executives resist such proposals but here again they can take a leaf out of the book of newspaper experience.

Many a fine writer, who could earn more money in other organizations, sticks to newspaper work because of flexibility of hours. The set hours are: (1) availability for assignment or consultation (which can be by telephone) (2) rigid adherence to interview, data-getting, or conference appointments (3) rigid adherence to deadlines.

Good writing—writing that gets better and better and casts new credit on an organization, its products, and the technical information which interprets them—is a difficult, demanding profession which requires probably more use of an individual's communication, personal relations, technical, and creative skills than anything except top management or research and development work.

Engineers, in technical information work, have much to give to writers, but the staff members with a predominantly "writer background" have far more to contribute, to engineers and to management, than has so far been generally recognized.

This article is the eighth in a series on technical publication management. A collected edition of reprints of the ten-article series will be available in January 1959. For information address: **Roswell Ward, Technical Publication Management Consultant, Rockledge, Bantam, Connecticut.**

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The Place of the Management Engineer

Is there a continuing place for the Management Engineer in the world's business?—or is the practice a fad of the period, accelerated by World War II, about to be relegated to the limbo of things best forgotten like the Efficiency Expert of another period?

by George V. Shearer

THIS article, seeking to establish the firm place of the Management Engineer, sets up two assumptions and attempts to prove them valid. These assumptions are:

It is natural to dissipate resources.

It is the prime duty of a management engineer to correct that tendency.

The tendency to dissipate resources is a natural one. The following examples are but a few of the most common seen on every hand. The one that comes to mind first is the fruit-tree. Left to itself, a fruit tree will progressively expend more of its energy to putting out useless shoots and branches and less to its actual function—producing more and better fruit. The tree must be carefully and scientifically pruned to conserve its resources for this function, and to direct its resources to that function.

The hybridization of corn is another outstanding example of controlling resources. No one strain of corn has the ability to improve itself, or even to maintain a high level of production for long. Guided cross-breeding of various strains has the effect of directing the best qualities of several strains into one better strain. Today's high yield of high-quality corn is the direct result of "managing" resources.

A house, in the natural course of events, will deteriorate and fall in decay. It is only by periodic review of conditions, and followup care, that the beauty and living qualities of an old house are maintained or improved.

A river, placidly flowing to the sea, is dissipating a wealth of resources. It has the resources to irrigate nonproductive lands and make them productive. It has, in its flowing, thousands or millions of kilowatt hours of electricity waiting to be tapped. It can furnish washing, drinking or cooling water to people and industries. All these, and more, are dissipated—or lost—to the sea unless engineers step in to direct the powers of the streams to productive uses.

Man is no exception. Men, and through men organizations and corporations, irretrievably lose millions of dollars every year through willful or unknowing dissipation of resources. The resources wasted may be money, manpower, supplies, utilities or even mental or physical energy. They are dissipated in many ways: the man who tries to build a little empire; the man who believes the answer is more people rather than better methods; the man who requisitions or hoards supplies or equipment beyond his actual requirements; the man who "hogs" space; the man who uses the "rule of thumb" method of running his factory or office; the man who establishes or exercises too much control, or too little; the man who neither plans nor schedules; and, most certainly, the man who says "this is the way we've done it, and we're going to continue this way." These men all dissipate resources.

Both man and nature are profligate with resources. Although much has been done to produce more from less, the requirement to do even more will increase year by year due to increasing demands. Necessity will continue to mother invention—the Management Engineer will have to continually come up with new and better ways to meet the demands.

Why? Because many of the resources on which we have depended for expansion of production cannot be increased and, therefore, means will have to be found for producing more from what is, and remains, available. Then, again, even though many types of resources are still abundant or being made more abundant and more available, it is no longer economically desirable to squander primary resources to produce a primary objective.

To illustrate this point, consider the plant that burns coal, oil or gas to produce steam for a primary objective—power. At one time both the residual heat and steam were discharged into the air. Now, through the use of heat-exchangers, the residual heat is put to work on secondary objectives, and the steam, back in water form, is returned to start a new cycle of steam production. Another illustration could be found in the same plant. For years to produce more heat all that was required was to pour on more coal and open the drafts, with no thought of what went up the smokestack. Now, with smokestack gases analyzed, controlled combustion returns much more heat (power) from less fuel. These aren't unusual instances of recovery of resources; they are typical of what must be done on a wholesale basis if the living standards of two billion people are to be raised. The principles may have to be discovered in laboratories, but Management Engineers will have to discover applications.

Demands will increase with the expansion or rollback of economic horizons. An example of that type of in-

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crease is found in the increased production of automobiles and the corresponding increase of highway systems capable of supporting more automobiles. As production of automobiles went up, prices went down, creating a bigger demand not only for automobiles, but also for highways—more, bigger and better. The extent of usable highways constituted one front of the economic horizon which was slowly but inexorably driven back in localized areas, but which continues to exist in a greater part of the world. The demand for more automobiles was further stimulated, artificially, by recurring changes in design, creating new demands for better fuels and lubricants and scores of other improvements, which meant further penetration on other fronts of the economic horizon. (The foregoing poses two serious questions confronting us today: (1) How much farther is it economically feasible or desirable to expand our present type road system? (2) Should we not call a halt to the terrific cost (and waste) of producing new model automobiles every year?) The astronomical production of automobiles, today, is due in part, most certainly, to more and bigger plants, but improved methods of production and distribution have made a major contribution.

Very roughly, one-fourth of the world today has three-fourths of the world's productive capacity; the fractions may vary slightly, but the larger fraction is made up of what we call "backward" countries. We have, then, a backward-country horizon—a line beyond which not even a demand has yet been stimulated. As that horizon is rolled back, demands are going to exceed anything ever known before. There are two reasons for this: there are more people behind that horizon than there are on this side; and the line will recede on wider fronts, and faster, than occurred in the past. This will present bigger markets faster. The demands will be met, in part, by increasing the number of producing plants, but, it is believed, more and more emphasis will be centered on producing more in plants already existing before new plants are built. The present cost, and evident future cost, of building new plants is so tremendous that we may be sure every expedient will be explored to boost production in what we have. The Management Engineer will provide improved methods of production, cheaper methods of distribution, and, of paramount importance, the organizations to accomplish those results.

To capture or rechannel available or potential resources for more efficient, more effective, more economical use, the Management Engineer is here to stay. By techniques developed, studied or learned by experience, the Management Engineer (known also by various other titles) works:

To perfect organizations.

To improve methods.

To improve space utilization.

To gear equipment or equipment requirements to actual or anticipated needs.

To measure personnel requirements and gear to workloads, or, conversely, gear workloads to personnel resources.

Although these are but a few of the functions of the Management Engineer, they are, certainly, sufficient evidence of the need for him. And since the problems requiring the attention of someone with his abilities are never ending, forever recurring, and, therefore, never resolved with finality, the need for the Management Engineer is a continuous one.

The Management Engineer is the individual whose skill is directed at preventing or correcting the dissipation of organizational resources by reviewing and analyzing all the resources available for use, and planning for the channelling of those resources into the maximum obtainable productive use—today and tomorrow.

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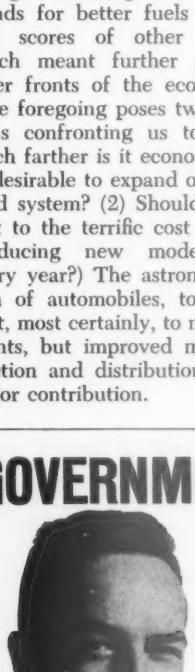

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WHAT DOES IT COST TO BECOME A CAPITALIST?

by W. Mac Stewart*

Judging by the number of inquiries we have received, there is a great deal of uncertainty in the minds of many military investors as to the actual cost of investing. What is sales charge . . . commission . . . odd-lots charge . . . etc.? Is it less expensive to buy listed securities in individual purchases or through the Monthly Investment Plan? These, and similar questions prompted us to set down a quick explanation of the cost of purchasing securities.

The average small investor who is buying common stock on a regular or semi-regular basis uses one of four methods:

1. Frequent or occasional purchases of over-the-counter stocks.
2. Purchases of selected listed stocks from a broker or dealer.
3. The New York Stock Exchange Monthly Investment Plan.
4. Monthly investment plan of a mutual fund.

No matter which method is used, the investor must pay for the service involved in distributing securities, whether it is called "commission," "sales charge," "load" or any other term. Let's examine the cost of investing through the above four methods.

1. Over-the-counter securities.

These are securities that are not listed on any major stock exchange. The sales charge on initial offering of these securities may be anywhere from 10% to 20% of the offering price of the stock. This cost is not stated separately, but is included in the offering price of the stock on initial offering. On resale of shares, the sales charge is usually lower, but still is generally higher than N.Y.S.E. commission.

2. Purchase of listed stocks.

These stocks are listed on one of the major stock exchanges, such as the New York or American. All broker dealers selling such stocks must sell at the established Exchange Commission rates. In the case of the N.Y.S.E., a purchase of under $100 carries a $6.00 commission. Purchases of more than $100 carry a lower commission, graduated downward as the amount of investment increases. However, the average military investor who purchases regularly is apt to be in the "under $100" category. In addition to this commission, there is an odd-lot charge for purchasing less than 100 shares at a time. This charge is 12½¢ per share on stock selling at less than $40 a share, and 25¢ per share on stock selling at $40 or more per share. Then the same commission schedule applies when you sell the stock. Here's an example: You buy 4 shares of X Co. common at $25 per share. Purchase price: $100.

N.Y. Stock Exchange commission	$6.00
Odd lot differential 12½¢ per share	.50
Total Expense	$6.50
% of total expense to investment	6½%

When you sell, if we assume the stock is still priced at $25.00, the same commission would apply. You pay another $6.50, or 6½%. Thus, your total "round trip" cost is 13% of the amount invested, plus Federal and New York State taxes. If dividends are to be reinvested, the same commission schedule applies to them.

3. New York Stock Exchange Monthly Investment Plan.

This plan, available through member firms of the N.Y.S.E., was established to permit the small investor to purchase full or fractional shares of stock on a monthly basis. The minimum investment is $40 each month or each quarter. However, only one issue may be purchased under each plan. The sales charge is the regular N.Y.S.E. commission and odd-lots fee schedule, explained above. For example:

You are buying Z Co. stock which is selling at $40 per share, and for simplifying this example, we assume it sells at the same price all through the life of the plan (actually, this is virtually impossible, as the stock price is bound to fluctuate). You are investing $50 a month for 150 months (12½ years). The stock yields a dividend of 55¢ per quarter (5.5% annual yield), and you want dividends to be reinvested. Here is a summary of

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your charges on the entire $7,500 you invest:

On monthly purchases

N.Y.S.E. Commission	$424.50
Odd-lot differential	43.95
For reinvestment of dividends	
N.Y.S.E. Commission	$166.46
Odd-lot differential	17.22
For liquidation	$101.95
Total Cost	$754.38

% of Total Cost to investment: 10.05%

This total "in and out" cost is lower than in the previous example because the larger number of shares liquidated reduced the commission and eliminated the odd-lots charge.

4. Monthly Investment plan of a mutual fund.

The sales charges of mutual funds range generally from 6% to 9%. A few funds advertise "no sales charge," but this is considered misleading by many investors . . . because it obviously costs money to distribute shares of any security. If this expense isn't announced as part of the price, it is likely hidden elsewhere—in operating costs, perhaps, or in a liquidating charge or charge for each payment or charge for reinvesting dividends. Better figure on paying about 8½%.

If it is less than 8%, look for the hidden costs. In all "front load" funds, this is a one-time charge—paid only when you buy. There is no charge for liquidation, nor for reinvesting dividends. Therefore, the 8½% is a "round trip" cost. In a fund, as with any securities, you also pay the Federal issuance taxes, which are not a major item. Whether you pay the bulk of the sales charge in the early years of the plan, as in a "front load" fund, or pay it equally out of each payment, as in a "level load" fund, the cost is the same. (The relative merits of the front load and level load plans were discussed in the August, 1958, issue.)

By way of comparison, let's take the same example used for the N.Y.S.E. Monthly Investment Plan. You are investing $50 a month in a mutual fund with an 8½% sales charge, for 150 months (12½ years), with reinvestment of dividends. Here is a summary of your charges taken out of the $7,500 you invest:

On monthly purchases	
Sales charge	$637.00
Odd-lot differential	.....
For reinvestment of dividends	.....
For liquidation	.....
Total Cost	$637.00

% of Total Cost to investment: 8½%.

Even omitting all other factors such as management, diversification, supervision, convenience, custodianship, earnings, growth, etc., it can be seen that the average small military investor who is setting aside $10 to $100 per month will pay less sales charge in a mutual fund than in the other commonly-used investment forms. The mistaken idea that mutual fund shares are expensive to buy comes from a provision peculiar to the Investment Companies Act of 1940 and the Securities and Exchange Commission regulations which requires funds to state clearly—and emphasize—the amount and percentage of sales charge. This is not required to the same extent in other forms of investment, nor in any other type of service or merchandise you purchase. And the sales charge is included in the offering price of mutual fund shares, while it is over and above the price of listed securities.

But whether you pay 8%, 10% or 13% sales charge, the important thing is to get started on a regular monthly investment program of some type. It is our firm belief that a systematic and regular investment in American industry is the most practical way for the average citizen to prepare for his future needs—to amass the large sum of capital he will need later for education of his children . . . for retirement . . . for a business of his own . . . or for fulfillment of whatever his financial goal may be. Only by having his money constantly working—earning and growing at a high rate, consistent with reasonable safety—can he hope to achieve financial security and independence.

Advertiser's Index

ACF Industries, Inc., American Car & Foundry Div. . . Cover 4
Air Transport Association . . . . . Cover 3
American Bosch Arma Corp. . . . . Cover 2
Belco Div., Miller Mfg. Co. 16
Canning, Sisson & Associates . . 16
Continental Aviation & Engineering Corp. 2
Government Employees Insurance Co. 46
Graphics Systems, Inc. 26
Hamilton Management Corp., The 31, 47
Keystone Co., The 47
Lockheed Aircraft Corp. 1
Management Control Charts Co. 4
Radio Corp. of America, Defense Electronic Products 12
Wassell Organization, Inc. 4, 19, 26, 30, 45

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Aeronautical Engineer, GS-13
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New Products

Lead Items This Month

(For more information, see advertisers' index)

Inventory Control

Wassell Organization, Inc. Lists 16 reasons why you should be cutting costs and speeding efficiency with the simplified inventory control, Sig-na-lok. Visible control puts inventory at your fingertips.

For more facts request No. 108 on reply card.

Boardmaster Control

Graphic Systems. This firm reports men interested in efficient management can get things done with Boardmaster Visual control which gives a graphic picture of operations, spotlighted in color, saves time, money, and stops errors.

For more facts request No. 107 on reply card.

Visual Control Board

Wassell Organization, Inc. Pro-duc-trol not only schedules but automatically checks with time, line, and color control, has low original and up-keep cost.

For more facts request No. 102 on reply card.

Management Guide

Wassell Organization, Inc. Every management executive concerned with defense production will want a copy of this new 40-page book of ideas for greater productivity at lower cost—just issued by the makers of Pro-duc-Trol for production control.

For more facts request No. 106 on reply card.

Replacement Faucet Stems

Miller Manufacturing Company Reports leaking compression-type faucets, lost water and excessive maintenance costs are gone forever with the installation of Belco ball bearing replacement stems, complete with bibb washers.

For more facts request No. 105 on reply card.

Visual Control Board

Wassell Organization, Inc. The new Vu-board, which shows all important data, sets up and operates easily, has unlimited uses for scheduling, charting, dispatching, etc., is offered at low cost by this firm.

For more facts request No. 109 on reply card.

Organization Chart

Management Control Charts Co. A typist, a typewriter and typing paper are all that is needed to keep this interchangeable organization chart up to date. The chart comes in any size, and uses photographs for sharp prints. It is a handy training aid, and has completely moveable and reusable parts. It is extremely easy to change, and eliminates costly re-drafting of other types of organization charts.

For more facts request No. 103 on reply card.

New Services

Income Fund

Keystone Company. Prospectuses describing series K-1, a diversified investment in securities selected for current income, are available at no obligation from this firm.

For more facts request No. 113 on reply card.

Filing Manual

Wassell Organization, Inc. A free booklet on filing is being offered by this firm, contains in charts and illustrations some answers to questions such as the space problem, how to eliminate congestion, comparison of three filing methods.

For more facts request No. 111 on reply card.

Data Processing Digest

Canning, Sisson & Assoc. Data Processing Digest is a monthly service, containing abstracts on Electronic Data Procession. Articles are reviewed from almost 100 periodicals monthly. Books are also abstracted.

For more facts request No. 104 on reply card.

Investments

Hamilton Management Corp. Through Hamilton Funds, Inc., a managed common stock investment fund, this firm offers lump sum or monthly investment plans to fit any budget. Interested persons can inquire without obligation. Firm recently declared another quarterly dividend.

For more facts request No. 110 on reply card

Auto Insurance

Government Employees Insurance Co. GEICO offers the same coverages and benefits provided by the Standard Family Automobile Policy—the same policy offered by most leading insurance companies. GEICO insures military and government personnel as preferred risks.

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Other New Products

LIQUID FLUX: A new liquid flux for torch brazing in production where automatic fluxing systems are used is announced by All-State Welding Alloys Co., Inc. The

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new All-State product is designated Super-Clean "Jet Flux" brazing liquid. It was developed especially for the firm's "Jet Flux" auto-dispenser, a simple, single-valve container through which the liquid is automatically metered into the acetylene or propane gas line leading to the brazing torch. It is usable as a replacement for other liquid brazing fluxes in any automatic fluxing system.

For more facts request No. 1 on reply card.

GUIDE-O-MATIC BULLETIN: Bulletin 586 has just been released to present up-to-date information on the Barrett Guide-O-Matic, the electronic industrial tractor which requires no operator. The Barrett Guide-O-Matic is a battery-powered electronically controlled tractor that tows trailer trucks over pre-determined routes without an operator. There are two types—wire guidance, and a new optical guidance system. The guide wire, an inexpensive insulated wire, is placed in a shallow slot in the floor, or merely taped to the floor along the route. A sensing unit on the Guide-O-Matic controls the tractor, guiding it right or left.

For more facts request No. 2 on reply card.

CHECK-SCALE: Designers and layout men need no longer be plagued by layout and dimensional accuracy problems. In a few simple steps, any layout or drawing may be detailed, scaled, checked, and accurately positioned with the aid of the "Check-scale." Made of .005 thickness mylar-base transparent film, "Check-scale" is specially treated to hold extreme dimensional stability, will not curl, discolor, warp, or chip, and will take penciling and erasures easily. The grid scale is 1/8 inch, with a 17"x11" printed image, trimmed to 19"x12".

For more facts request No. 3 on reply card.

X-BAND RADIO TELESCOPE RECEIVER: Ewen Knight Corporation has developed for production an X-band radiometer designated EK/H11-X2C. This radiometer is sensitive to X-band "noise" radiation levels as low as 0.01°KELVIN, with integration time constants as low as 100 seconds. The prototype of the EK/H11-X2C was operated with a 28-foot parabolic reflector in 1957 to accomplish the first successful detection of Saturn and planetary nebulae as radio sources.

For more facts request No. 4 on reply card.

PHOTO COPYING MACHINE: Rovico, Inc., producer of Fotomate photographic copying machines, today reported development of new features which more than double the copying speeds of its all-purpose equipment. The new Rovico models feature larger throat capacities of 12" in the Standard, 16" in the Executive and 20" in the Copymaster. Rovico's new Standard model throat, has been increased from 10" to 12" to permit feeding of 8½" by 11" letterheads into the machine sideways instead of lengthwise.

For more facts request No. 5 on reply card.

MACHINING STEEL BAR: With shafting specifications requiring tighter tolerances and industry in general demanding materials with superior properties, a series of improvements in today's STRESSPROOF steel bars offers new application opportunities. La Salle Steel Company, Hammond, Indiana, exclusive producers of this material, say that improved STRESSPROOF is now available to users for parts requiring strength, excellent machinability and closer accuracy. The yield strength of STRESSPROOF is now 100,000 psi in all sizes. This is available to the user in the bar as received and requires no heat treating.

For more facts request No. 6 on reply card.

ELECTRONICS CATALOG: Allied Radio Corp. announce the release of their 1959 general catalog of electronic parts and equipment, including a complete line of high-fidelity components. The new 452-page catalog (208 pages in rotogravure and 4-color covers), lists over 32,000 items. Included are professional-quality electronic instruments for the engineer, technician, serviceman and for production line work; new monaural and stereo hi-fi kits, and kits for the radio amateur.

For more facts request No. 7 on reply card.

SAFETY CHART: A large safety wall chart providing instructions for the proper handling of chlorate and perchlorate chemicals has been prepared by American Potash & Chemical Corporation for use by companies active in chlorate and perchlorate application. The newly prepared wall chart is a digest of safety rules and conduct. It includes subjects such as follows: materials that may ignite if mixed with chlorates or perchlorates, what types of clothing to wear and how to care for clothing when working with the chemicals, how the chemicals should be handled, stored, shipped and unloaded.

For more facts request No. 8 on reply card.

PUMP LITERATURE: A new 4-page, 8½ x 11 illustrated 3-color catalog describing the operation of the Pesco Variable Displacement Internal-External Pump (VIEP) is now available from Pesco Products Division, Borg-Warner Corporation, Bedford, Ohio. Description of the operation of the VIEP is supplemented with 3-color schematic drawings. One view shows zero displacement pump operating position; the other view shows full displacement pump operating position. Included in the catalog is a list of advantages of the Pesco pump and suggested applications for aircraft, commercial and industrial equipment.

For more facts request No. 9 on reply card.

ALTITUDE CONTROLLER: This precision instrument, which is sensitive to minute variations in static pressure, maintains an aircraft at a constant barometric altitude. The controller operates in the range of from minus 1,000 feet to plus 60,000 feet. Using the most advanced developments in transistors and other miniaturized components, it is sensitive to plus or minus 2½ feet at sea level. At 60,000 feet of altitude this represents a sensitivity of plus or minus 25 feet. The construction of the controller isolates the gear train and the cam linkage mechanism from distortions which might be introduced by the air frame. The use of hardened stainless steel gearing, sapphire cam surfaces and individually balanced moving parts insure the utmost in reliable performance and long life.

For more facts request No. 21 on reply card.

NEW TYPE "WALKIE" TRUCK: A new line of rider-type, high-lift JackStacker materials-handling trucks operated from a complete set of controls on the platform has been introduced by Lewis-Shepard Products, Inc. This new line of electrically powered units is an adaptation of L-S walkie-type JackStacker trucks, which are operated from a control handle at the front while walking along with them. On these new articulated vehicles, the operator drives while standing on the platform. The full set of controls for steering, lifting, lowering and driving in forward or reverse allows him to control all movements of the truck from his stand-drive position. Available in capacities from 1500-3000 pounds, each unit has a 3½-ft.-high screen guard at both sides of the operating position to protect the driver. The trucks are offered with either forks or platforms.

For more facts request No. 25 on reply card.

MINIATURE TELEPHONE-TYPE RELAY: A miniature telephone-type relay featuring a push-to-release reset lever has been announced by Potter & Brumfield, Inc., the relay manufacturing subsidiary of American Machine & Foundry Company. The relay, designated the MA, operates on 2.4-watt, 25-millisecond pulses and features contact arrangements up to 4PDT.

For more facts request No. 26 on reply card.

NEW MINIATURE RELAY: A new relay, E420D, has been introduced by the Electro-Mechanical Specialties Co., Inc., of Los Angeles, California. This new unit has been designed to meet the stringent requirements for airborne and missile applications per MIL-R-5757B and MIL-R-6106B. This contact rating in a small package with 005 contact resistance enables design engineers to save both chassis area and weight. Unit is 1 7/16 x 1 7/16 x 2 in., exclusive of connector.

For more facts request No. 27 on reply card.

BOOKLET ON NEW STEELSTRAPPER: An 8-page booklet on the Acme Steel A4 Pneumatic Steelstrapper, the first fully powered combination steel strapping tool, is available from Acme Steel Company. The new booklet shows typical applications, pictorial operating instructions and specifications on the new tool, which provides power for every operation after the strap is inserted. Tensioning, sealing and cutting are all done by air power.

For more facts request No. 28 on reply card.

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51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
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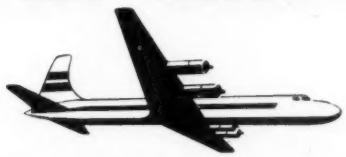

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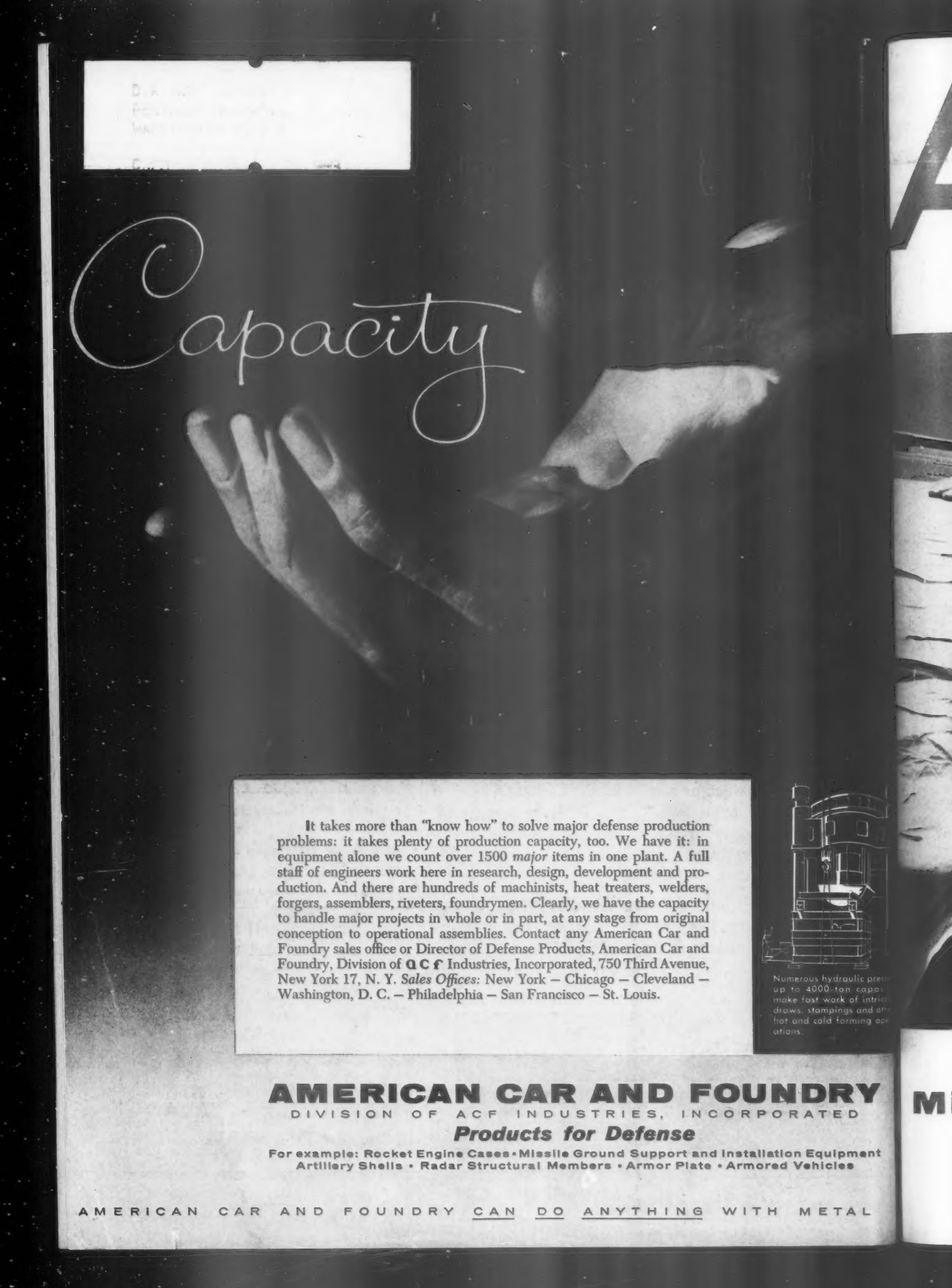

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